SCIENCE GOSSIP.

HARDWICKE'S

SCIENCE-GOSSIP

FOR 1873.

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Science-Gossip:

AN ILLUSTRATED MEDIUM OF INTERCHANGE AND GOSSIP

FOR STUDENTS AND

LOVERS OF NATURE.

EDITED BY J. E. TAYLOR, F.L.S., F.G.S., &c.,

HON. MEMBER OF THE MANCHESTER LITERARY CLUB; HON. MEMBER OF NORWICH GEOLOGICAL SOCIETY; HON. MEMBER OF ROTHERHAM LITERARY AND SCIENTIFIC SOCIETY; AUTHOR OF "GEOLOGY OF MANCHESTER," "GEOLOGICAL STORIES," "HALF-HOURS AT THE SEASIDE," "HALF-HOURS IN THE GREEN LANES," ETC.

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1873.

THE diffidence with which we undertook the onerous duties of editing a popular Scientific Journal has given way to confidence,—thanks to the able and ready support we have received on all hands. Hence, at the close of another year, we find the editorial chair more comfortable, whilst the circle of our friends is considerably enlarged. On every hand ready assistance and generous forbearance have been accorded to us.

The rapidity with which an interest in Natural Science is spreading is unprecedented. Its speculative discoveries are affecting every department of Modern Philosophy, and he would be a rash man who now declared, like Dr. Johnson, that Natural History was fit only for children! Wise men are beginning to see that it is necessary to make a place for Natural Science teaching in any scheme of education worthy the name.

One of the chief intellectual signs of the times is the fact that some department of Natural Science is frequently taken up, by both sexes, as a healthful recreation. The number of such people is daily increasing, and it is to them, as well as to the younger students, that SCIENCE-GOSSIP is particularly addressed. We have many tastes to cater for, and our desire is to have every branch of Natural Science as fairly represented as our space will allow.

Whatever merit may be attached to our Editorial duties, we feel that without the aid of a volunteer staff, which includes some of the

best known names in Science, our most arduous efforts would have been vain. To them, therefore, we tender one grateful thanks.

To such of our eager correspondents as may have been disappointed through their queries not having been answered so quickly as they would have liked, or whose "exchanges" have not appeared at the time required, we can only point to the crowded state of our last page, and the fact that, excluding other usual matters, we have devoted it to them. The "Questions" sent range from the most simple and easily obtainable by the querists themselves, to others requiring the utmost scientific knowledge and acumen to answer.

To all, querists and readers, we return our best thanks for kindly forbearance and sympathy. It is with pleasure we announce that Science-Gossip never had a larger *clientèle*. In the spirit of satisfactory hopefulness, therefore, we wish our large circle of friends

"A Happy New Year!"

LIST OF ILLUSTRATIONS.

RECENT RECORDS OF RARE PLANTS.

SUPPLEMENTARY to the excellent remarks by Mr. Edwin Lees (p. 77, last vol.) anent alterations in, or uncertainty of, long-ago recorded localities for rare plants, and apropos of Mr. J. B. Blow's suggestion (p. 115) for the formation of a botanical Locality-record Club, with which the former paper has a not remote connection, a little gossip may not, perhaps, be out of place.

I am afraid it would be somewhat difficult to secure sufficient trustworthy and valuable co-operation, over so great an area as Britain, to render Mr. Blow's plan successful. Most of the older and more experienced botanists who formed the van of the workers when science was not so popular as now, and who are the original recorders of a great part of the localities, copied, one from the other, into our manuals, have become too infirm, or too occupied with weightier matters, to be able to go to the not small trouble of visiting and verifying anew stations they explored thoroughly in bygone years; and of the younger generation, not a few are as yet mere "collectors," who, however enthusiastic they may be, are scarcely the ones whose search of or report upon any wide locality could be thoroughly trusted, or whose statements and judgments accepted without question. Nevertheless, I should be glad to see such a plan as Mr. Blow suggests fairly tested, and willing to take upon myself the task of aiding it so far as I could—say, by undertaking to visit and verify as speedily as possible all stations for rare plants within this county of Durham, as I have already tried to do for the West Riding of Yorkshire, having suffered repeatedly myself both in loss of time and in pocket from the misleading suggestions of local floras, whose authors not unfrequently, though good general botanists, have but little practical field knowledge, and are as unfit, from the want of it, to sift of error the statements of others, as they are unable at sight to pronounce with any accuracy upon a species of Rose, of Hawkweed, or of Willow!

Suppose, however, the club formed, and a goodly number of willing observers engaged to visit and report upon noteworthy localities, whilst seeking for new ones, their records would be worse than useless if not made *more* reliable than the existing Floras, and if rendered so, but a small advance would even then be made upon the work which, though indirectly, and limitedly, from want of numbers, is none the less surely being done by the Botanical Exchange Club, under whose skilled supervision, year by year, new plants or species from new localities, or old ones, are distributed and commented upon.

To render the proposed record trustworthy, however, a specimen of the plant found should accompany every notice of its new or verified locality: and many who would be glad to contribute statements would be unwilling to do this. The plants sent would still require to be examined and attested by reliable authorities, as correct not only in name, but also (spot where found and character of species considered) referred to their proper classes of citizenship. This may seem not very difficult, yet existing Floras, &c., show that few except the highest botanical authorities, or those who have special district knowledge, are capable of pronouncing on such points without much liability to error; and of these, taking into consideration the vast amount of work the task would entail upon them, how many would come forward willing to fill a place upon such a bench of botanical censors? Without such censors and such authentication the records would not be worth a great deal. Unfitness of Flora-authors for their task, or the more culpable want of care in this matter of verification,

is the source of most annoying errors sometimes. Some slovenly, or young observer, for example, gathers *Vaccinium Vitis Idæa* in fruit on a stony mountain-heath, mistakes it for *Arbutus Uva-ursi*, and recording it to the Flora author as such, the station being a not unlikely one for the latter plant, his statement passes without question, and once down in print, the negative is not easy of proof; the vain searcher is always the "careless one," who must have "missed it somehow"! Such a mistake as this I know has occurred. If botanists would only be as careful and accurate in their records as Mr. Baker for instance, in the Floras which bear his name, there would be little complaint to make except as to the tendency of technical writers to copy localities without inquiry,—an unsafe proceeding in the case of at least one out of four species, the reasons for which Mr. Edwin Lees has already so clearly explained at page 77. His suggestions as to the latest date being given on which a rare plant was seen, &c., would go hand in hand with the carrying out of Mr. Blow's idea. Certainly some such record is a great desideratum, for at present lists of plants are excluded from all our natural history journals, and find expression, unluckily, in the hasty attempts at partial floras, neither very useful nor very accurate as such, but which, published in a serial, open to correction and criticism as they would be, would have a distinct value.

It may perhaps be worth while to occupy a little more space with brief remarks upon a few of our rarest plants, supplementary to those mentioned by Mr. Edwin Lees, localities for which are given even in our latest Floras, but in which it is useless now to search, and of some few others which still exist as of old;—the result of excursions made by the writer in search of them during the last two or three years. Such a record may point out to others who contemplate visiting the "book stations" the probable futility or success of their search.

To commence with the pleasanter task—enumeration of a few species not quite eradicated as yet: in Leckby Carr, near Topcliffe, Yorkshire, *Scheuchzeria palustris* and *Lysimachia thyrsiflora* still find a home. In 1870 the former of these was still somewhat plentiful in the larger patch of peat bog farthest from the river, closed in on all sides by Spruce and other trees; *Lysimachia* mainly in the larger ditch and watery spaces under the low brushwood at the north-east corner of the Carr. Both species are extremely local, and preparations for drainage in the shape of tiles, &c., lying about, and brushwood cleared away, seemed to point to speedy encroachment upon the ground occupied by one, if not both, of these interesting plants.

Potentilla rupestris still grows in some plenty in one spot on Craig Breidden, Montgomeryshire, on the slope facing west, at the northernmost corner of the mountain, somewhat low down towards the Severn Valley; and *Lychnis viscaria* also on the same hill, on eruptive rock facing south-east.

Arabis ciliata is recorded as growing on rocks near the sea at Lidstep, near Tenby. In May, 1871, I was unable to find the true plant there, however, and should be glad to know when and whereabouts it was last gathered.

Euphorbia stricta was plentiful in 1871 below the Wynd Cliff, and along the valley as far as Tintern Abbey; in several places where the trees had been felled and a strong brushwood was growing up.

Euphorbia pilosa, another of our most local species, still flourished near Bath in May, 1871. It would seem to be not nearly so common as formerly "in the lane leading west from Prior's Bank," the usual locality given in manuals, and I could only find two or three small flowerless shoots there; but after a weary search in many a coppice and wood on that side of Bath, I at last stumbled across it in great plenty in one small plantation, isolated in the centre of a large pasture, next that in which stands an observatory-like tower, growing in profusion amongst a dense underwood of hazel and briar.

On Cheddar Cliffs, Somerset, *Dianthus cæsius* still grows, its tufts hanging from the crevices of limestone rock far beyond the reach of ruthless hands. Not so the case with *Arabis stricta*, which was formerly found both here and on St. Vincent's Rocks, Bristol, "chiefly below the sea-wall," but which I sought for in vain in 1871, and which is almost, if not quite, extinct now.

Recent confirmation of the existence of *Simethis bicolor* "in the fir-plantation skirting the cliffs, two miles from Bournemouth, on the Poole side," also seems desirable, since, minute as my direction seemed, and patient as I knew my search was (early in June, 1871,) it was unsuccessful.

Again, *Helianthemum Breweri*, and *Cineraria maritima* are two amongst our rarer plants, rendered almost, if not quite, extinct at Holyhead by the alteration and disturbance of the maritime rocks there for purposes of harbour improvement.

Before leaving these notices of probable extinctions, two more species seem to deserve mention. Has *Isnardia palustris* or *Spiranthes æstivalis* been seen in England for years? I have sought both in vain, though the orchid may be subject to the same ghost-like uncertainty of appearance which obtains with others of its tribe.

Turning northwards, it may be interesting to know that *Lychnis alpina* thrives as of old on the steep fell south of the Keswick and Whinlatter road, at a point about four miles west of Keswick; and that the very pretty *Geranium Lancastriense* grew profusely on the western sea-bank of Walney Island, at a point opposite the Barrow ferry, in the autumn of 1871.

And on Widdy Bank Fell, in Teesdale, not

long ago, I had the opportunity of assuring myself that *Arenaria uliginosa*, one of our very rarest plants, still existed in this its only station in Britain, at the head of a small streamlet on the western edge of the limestone plateau; and in a swamp and elsewhere near it, and flowering abundantly, the pretty *Thalictrum alpinum*,—this Teesdale valley also its only station in England.

In conclusion I may say that *Scheuchzeria palustris*, which was formerly found on Thorne Moor, in South Yorkshire, is quite extinct now in this station; and two other rare plants, *Lathyrus palustris* and *Peucedanum palustre*, which grew on the borders of the swampy moor, are very nearly so,—a result due to drainage lately carried out on a large scale. In 1870, when I visited it, huge dykes had been cut in all directions across the Moss; the peat piled in great heaps, the surface turned with the plough, and the whole of this extensive waste being rapidly "reclaimed" by some ruthless foe to botany; though perhaps some will agree with Mr. Grindon, who, in his "Field and Garden Botany," commenting upon the disappearance of *Lobelia urens* (since re-discovered, I am informed, by the Hon. Mr. Warren) from Axminster Heath, within the last few years, remarks—"but the right onward furrow of a generous utility is better than the preservation of a thousand wild Lobelias"!

F. Arnold Lees, F.L.S., L.R.C.P. Lond.
Hartlepool, Durham.

HOW I TRIED TO POISON AN ADJUTANT.

"WHAT a villain!" I can fancy escapes involuntarily from my reader as he sees the heading of this article; "surely the man was tried for attempted manslaughter!"

No, my friend, I was not "tried," nor did I seek to make away with *our* Adjutant, for he was a very good fellow; but I wanted one of those odd, quaint-looking birds that haunt the purlieus of Calcutta, yclept the Scavenger-bird, or, as he is better known by his more common name, the "Adjutant" (*Leptoptilos argala*); and as his person is sacred to the natives, I dared not openly shoot or destroy one, although, wishing to have a good specimen, I admit that I *did* surreptitiously try the effect of poison, with what success shall be seen.

A vulgar, disgusting-looking fellow is this same bird. How knowing he looks as he stands on one leg, which is clasped with the other foot above the knee, and eyes you askance, like a knowing old file, as you pass near him; but if you approach too near he stalks stealthily away with a sidelong glance and shuffling step, till he conceives himself to be at a safe distance, when he again settles down into a dreamy, dozy state of existence.

Perched on a housetop, he stands like a sentinel, until a whiff of carrion reminds him of a savoury morsel below, when he spreads his wings and swoops to the spot, clapping his bill together with a noise that resounds as he passes overhead.

The bird stands from four to five feet high when erect, and its bare, red, fleshy neck gives it the appearance of what it naturally is, an obscene, carrion-loving feeder.

The legs are long and slender, like those of the crane, of which species he is a member; the body oval, with white breast and dark-coloured back and wings. The bill is from twelve to sixteen inches in length, is broad at the base, with very powerful leverage, and tapering away to a point. I have seen one of these birds take a shin-bone of beef endwise in his bill, raise his head in the air, and swallow it whole at a gulp!

He is a most useful member of society in the tropics, quickly clearing by day all the offal and offensive matter not devoured by the troops of howling jackals by night.

But to return to my endeavours to circumvent one of these gentlemen. I was always partial to taxidermy, and had long been on the look-out for one of those huge bats called Flying-foxes (*Pteropus Javanicus*), which cross over the Hooghly from the Howra side of Calcutta regularly as sundown, and go—who knows where! Often after a blazing hot day, the reminiscence of which alone almost brings back the prickly heat, have I lain about sunset on the smooth glacis, watching these bats in their flight as they came like specks from the opposite shore; first one or two, then a few more, and gradually increasing in numbers until the sky would be dense with them, when they again straggled into a rear-guard of a few, and would be gone. They were always out of gunshot, but at last I succeeded in getting one from a native, and in the cool of the following morning sat in my verandah and proceeded to operate upon him. I had just cleared the body from the skin, when our Adjutant, who had his quarters next to mine, made his appearance. "I should like to get one of my namesakes," said he, pointing to a posse of six or seven of them perched on a wall across the square, on the look-out for what might be thrown to them from the cook-houses. "The very thought that has often struck me," said I; "but you know, my dear fellow, we dare not shoot one." "No, but don't you think some of this stuff you have here would do the business?" "By Jove, the very thing!" The body of the bat was soon stuffed with a decent quantity of arsenical paste and corrosive sublimate, enough to kill about twenty men; a good swing with a one, two, and three, and out it flew into the middle of the square. Down swooped the birds, their bills clattering like so many powerful castanets, and the poisoned carcass was in a twinkling poised on the bill of the foremost, and as quickly

passed down his gullet. "Now we have you," said we, as we singled him out from the rest, and watched him return to his former station; but we counted our chickens before they were hatched! Momentarily we expected to see him become uneasy, and succumb to the effects of the dose; but no, there he remained for three mortal hours without a sign of discomfort, and at last flew off with his friends, as if his meal had digested to his satisfaction!

We were thus disappointed of our prey, and I very much doubt if the poison had any ultimate effect on him, for the birds never left their immediate haunts; and had he died, his body must have been picked up within the fort, and it would certainly have been known. "ARGALA."

THE THYSANURADÆ.

(SECOND ARTICLE.)

HAVING in my former paper briefly alluded to the *Lepismadæ* as represented in this country, I now, in continuation of the subject, venture to make a few remarks upon the *Poduradæ*, consisting of Smynthurus, Podura, and Lipura.

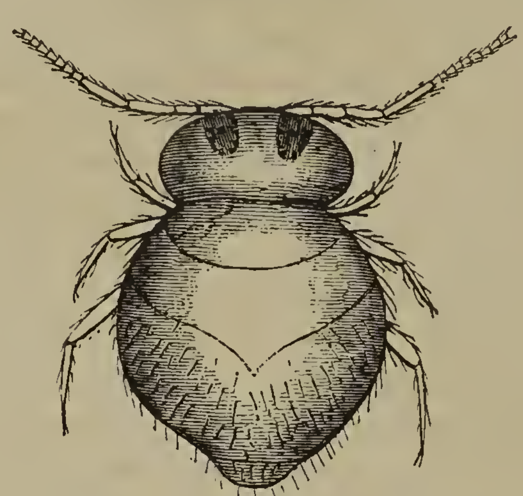


Fig. 1. *Smynthurus niger*, × 40, upper side.

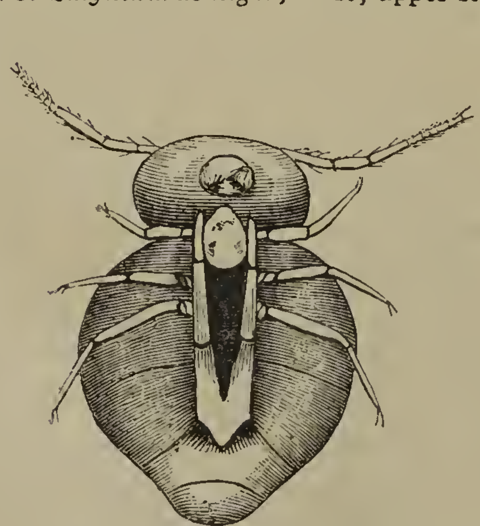


Fig. 2. Lower side of ditto, × 40.

In Smynthurus the body is more or less globular; in Podura it is linear; and all the members of both these divisions are furnished with a forked abdominal appendage called "the springer." In Lipura the springer is absent, and the body is linear, and very like that of some of the members of the division Podura.

Their principal common characteristic is the possession of a ventral tube, the office of which is at present only partially known. Its most obvious function is that of a sucker, enabling the possessor to obtain by its means a more secure foot-hold than its bifid toes alone would get. It also is a lubricating organ. And, altogether, its importance is so great, that I believe Sir John Lubbock will deal with it in a special manner in his classification of the order.

It is not so easy to give a comprehensive view of the *Poduradæ* as of the *Lepismadæ*, because the insects are more numerous.

As some of them have been alluded to by me in previous papers (*Monthly Micro. Journal*, 1869, "The Scale-bearing Poduræ," and SCIENCE-GOSSIP, 1867, "Poduræ"), I shall, for the sake of brevity, refer to those papers, rather than recapitulate anything which was correctly said then. Where my opinions have undergone some change, I shall endeavour to find room for a word or two.

Smynthuridæ.—These, of which there are three genera, founded chiefly on the jointing of their antennæ,—Smynthurus, Papirius, and Dycyrtoma, are very abundant little creatures, though very little known. Some of them are found on the surface of weedy ponds; but their most favourite localities are grassy meadows and peat-bogs. Some, too, haunt kitchen-gardens; and I once saw, when a friend was potting out some geraniums, that the empty flowerpots were made a promenade of by thousands of a tiny black species, which looked as if some chimney-pot in the neighbourhood had favoured the locality with an abundant shower of smuts. It was only on close examination that the real character of the deposit was apparent. They were so nimble when approached with a view to capture them, that I only got a few. I give figures of one of them in two positions, and am sorry that space compels me to force that illustration to do duty for all the Smynthuridæ, of which there are about a dozen species, chiefly discovered by Sir John Lubbock. All of them have large heads, more or less globular bodies, and prodigious forked springers. Viewed sidewise, they have always called to my mind the pictures of that extinct bird the Dodo. They are of various colours, and their antennæ are long and composed of numerous joints. As I said above, the genera are founded upon the manner of the jointing, &c., of these limbs. They are all scaleless, and the development of the ventral tube is very extraordinary. Sometimes two filaments of surprising length are projected from this organ, wriggled round the shoulders and back, and as suddenly retracted into their former position. The Smynthuridæ are said to breathe by means of tracheæ, and the spiracles

are said to be in the head. (Some readers will recollect that in Trombidium and some of the Acari this is the position assigned to the spiracles.)

When sweeping nettlebanks for insects, I have found Smynthurus and Papirius in the muslin of the net in abundance, and a dip of the collecting-bottle among the weeds at the surface or margin of a pond has often yielded some, together with many examples of the second family, which we must now turn our attention to. I have never met with Dycyrtoma.

Before quitting this subject I may, perhaps, call attention to a curious performance by these insects, which I have frequently observed when I have confined a few in a test-tube. Two of them will lock their antennæ together, and drag each other about. The movement may be an amative one, but, to my superficial observation, it rather conveyed the notion that the fun of wrestling was enjoyed and practised by certain creatures very much unknown to the patrons of the "noble art, &c."

Fig. 3. *Lepidocyrtus purpureus*, × 32.

Fig. 4. *L. gibbulus*, × 32.

The *Poduradæ* consist of many genera. The scale-bearing genera are Macrotoma, Lepidocyrtus, Templetonia, Seira, and Beckia. The non-scale-bearing are Orchesella, Degeeria, Podura, Isotoma, and Achorutes.

We will first take a rapid glance at the scale-bearing genera.

Macrotoma, of which there are several species, is frequently of large size; a quarter of an inch in length and more (see *Monthly Micro. Journ.*, 1869, Plate VIII., and SCIENCE-GOSSIP, 1867, page 59, fig. 50).

Lepidocyrtus.—There are many species, including the celebrated "test" insect, which is *L. curvicollis*, in all probability (SCIENCE-GOSSIP, 1867, page 55, figs. 38, 39, 40, 42, and *Monthly Micro. Journal*, 1869, Plate VIII.). I give additional figures of two of the smaller species. They are all gorgeously iridescent figures.

Templetonia, so far as I know, is represented by only one species—a glistening white insect, with five-jointed antennæ, the last joint being ringed (SCIENCE-GOSSIP, 1867, figs. 46 and 47). It is one of the easiest to rear in cork cells, and will multiply freely, repaying the observer for his trouble by its beauty and interesting habits (see also *Monthly Micro. Journal*, 1869, Plate VII.). It inhabits cellars chiefly.

Seira (separated from *Degeeria* by Sir John Lubbock) consists of only two species: *Seira domestica* (formerly *Degeeria domestica*) and *Seira Buskii*. The former I have called (SCIENCE-GOSSIP, 1867, and *Monthly Micro. Journal*, 1869, Plate VII.) "Speckled" Podura; and the latter is figured in *Monthly Micro. Journal*, 1869, Plate VII., as the "Greenhouse Degeeria." It is a pretty little creature, and is interesting, not only from the remarkable character of its scales, but also from the suspicion which some entertain (myself included) that it may be only a sexual distinction of *Degeeria Nicoletii*, which it much resembles, as well as consorts with. It is found about old woodwork and flowerpots in greenhouses. The late Rev. J. B. Reade called it *Podura transit*, because he used to find it on his transit instrument.

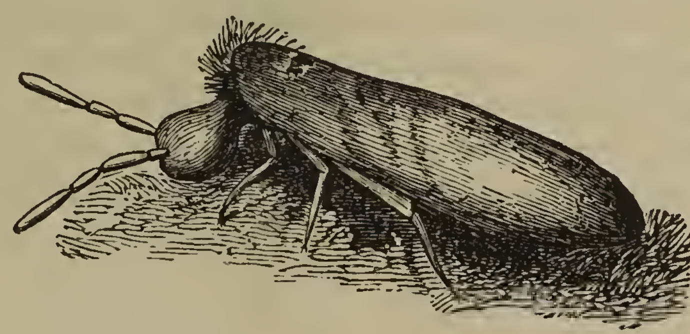


Fig. 5. *Beckia nitida* (cream-colour), × 32.

Beckia is a new genus, named by Sir John Lubbock in honour of Richard Beck, and, so far as I know, represented by only one insect; cream-coloured, and active to an astonishing degree; found chiefly in manure-heaps and decaying leaves. It has no eyes; yet is apparently under no disadvantage from this, as the use it makes of its antennæ evidences. Its scale is of no value, though its structure is akin to that of the scales of Lepidocyrtus.

Now for the non-scale-bearing genera:—

Orchesella is one of the largest of the Poduræ, and I have only met with two species. *Orchesella pilosa* is a very hairy creature, often found asleep under stones and in moss; exceedingly active when woke up. *O. cincta* is found in similar situations. It is not so large as *O. pilosa*, nor yet so hairy. It is brown with dark markings, and a pale greenish band and patches across its back. Both species have six-jointed antennæ. It is in this genus that the evidence of the faculty (common to all the group) of renewing the limbs is most striking. Owing to accidents, a joint or two of the antennæ are frequently broken off, and the progress of the repairing process may be observed in the majority

of specimens captured, reminding one of similar repairing processes in the Crustacea (crabs, lobsters, &c.).

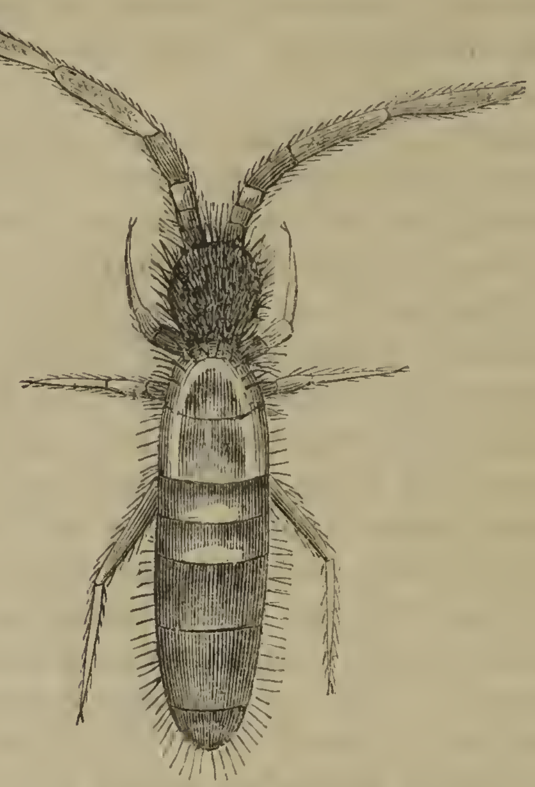


Fig. 6. *Orchesella cincta*, × 15.

Degeeria is a very abundant genus. Peel off the bark of any tree and you will disturb numbers. So also will they be found abundantly under the first heap of brickbats you choose to search; and even the dry sea-weed, just beyond the reach of the tide,

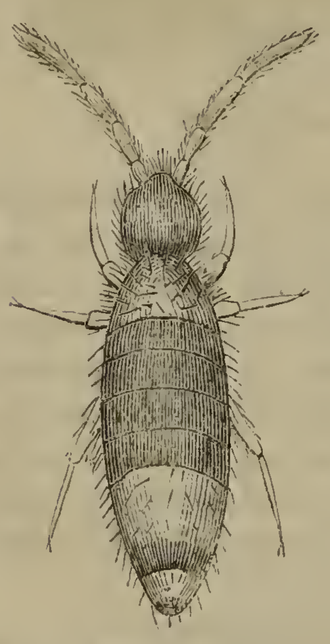


Fig. 7. *Degeeria cincta*, × 25.

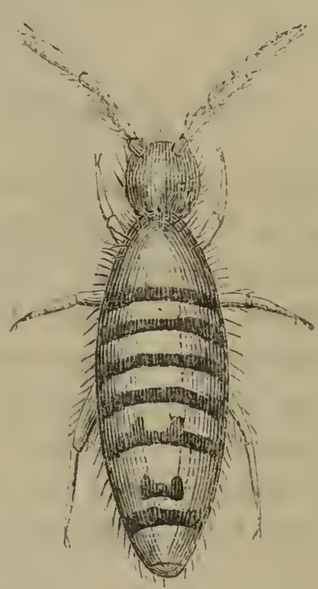


Fig. 8. *D. Nicoletii*, × 25 (without scales), *Seira Buskii* (with scales).

will yield them in crowds. They are capital runners; and a glance at the figures will enable the reader to recognize them by their spindle-shaped bodies at once when he meets with them. There are many species, and their colours are mostly yellowish stone-colour, with brownish-purple blotches and bands. One of them, *D. Nicoletii*, is marked exactly like *Seira Buskii;* and the two are often found in company. (The markings on the skin of *Seira Buskii* are not always seen till the scales which that species is furnished with are partially removed.)

Podura.—There has only one species come under my notice, and this is *P. aquatica.* It congregates in patches, sometimes extensive, on the surface of stagnant ponds, and looks, to the naked eye, like a deposit of soot. When examined under the microscope the colour is much modified, and a dark reddish-brown would be a more correct description of it. I have found it very abundant on occasions on Hampstead Heath, Wandsworth Common, and Streatham. It has a very long springer.

Isotoma.—Several species of Isotoma have come under my notice. One of them, figured in Science-Gossip, 1867, page 53, is *I. trifasciata.* It is to be captured under decaying leaves and wood. Others may be taken on the weeds at the margin of ponds and ditches. And one very pretty species, with a velvety skin, which changes colour under the microscope according to the direction in which it is lit up—purple, green, and black,—inhabits the bark of trees. None of the Isotomæ can be regarded as active insects: they can walk tolerably fast, but their springer is rather short in proportion to their length, and so they are not very good jumpers.

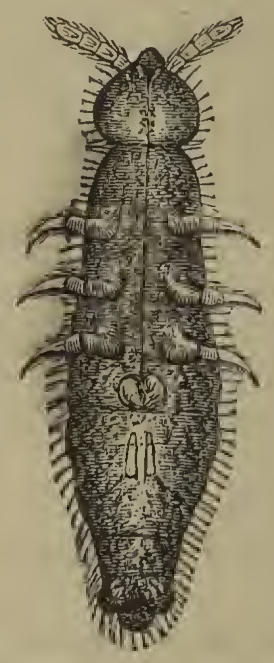


Fig. 9. *Achorutes purpurescens*, × 32.

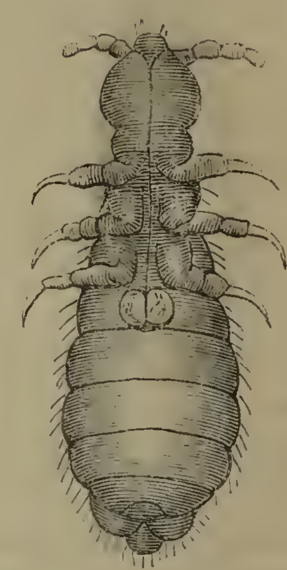


Fig. 10. *Lipura maritima*, × 25 (dark blue).

Achorutes, the last genus, is very abundant in certain localities, especially brewers' cellars. *A. purpurescens* is purple in colour and very sluggish in its movements. I have often found pieces of decaying vegetables covered with a perfect crust of them—thousands of all sizes. When hatched, the young ones are white; soon they become pinkish in colour; and after each change of skin they acquire a deeper tint, passing through various red and brown shades, till the purple tint is at last reached. Several species are recorded, but I confess I have not paid much attention to the distinctions. In Achorutes the springer is very minute, and I cannot call to mind having ever seen the insect jump.

We have now taken our rapid glance at the Poduradæ, and the Lipuradæ alone remain to be

dealt with. Fortunately for the space at our disposal, we have only two genera to allude to—Lipura and Anura—and these I must quickly dismiss, as my acquaintance with them is very imperfect. Both genera are destitute of the springer.

Lipura is represented by that blue podura which inhabits the wet sea-weed and the rock-pools at the seaside. It is *L. maritima*. I have seen no other species than this. Others are recorded as having been found on garden-walks, &c. The genus has ten eyes—five on each side of the head.

Anura I may have seen, but have not paid much attention to it. Its head is said to be more triangular than that of Lipura; and also, if I recollect rightly, the eyes are more numerous than in that genus. It is liable to be confused with Achorutes and Lipura.

Many points have necessarily been omitted in this rapid sketch on which readers would doubtless desire me to have dwelt; but I have been compelled to pass them by, chiefly because my own information is so very imperfect, but also, to a great extent, because Sir John Lubbock's "Monograph" is on the point of issue. Possibly, however, enough has been said to assist some intelligent workers in their inquiries; and if this should be the case, my object will have been attained.

I have often, when turning over brickbats for intellectual entertainment, been struck with the interest which the above creatures might afford to many, and the ignorance respecting them which neglect has caused. Poduræ seem to be the small game on which the rapacious Arachnida feed. Now one sees a tiny spider running off with one in his fangs, and, perhaps, a few inches off, an Obisium is seen chasing a small company of them out of a cranny. His proceedings, and the dodges of the Poduræ in their efforts to escape, afford five minutes' exciting occupation. One does not see these sights, however, till the eyes have become accustomed to the close scrutiny which is requisite. At first on the lifting up of a stone, nothing but cobwebs, it may be, are seen; but after a minute or so of careful watching, some of the various creatures are discovered, and the longer one looks the more one sees.

For the present, then, we take leave of the Thysanura. S. J. M'Intire.

SKETCHES IN THE WEST OF IRELAND.

By G. H. Kinahan.

Chapter II.

A LITTLE west of Gort are the round tower and seven churches of Kilmacduagh. The tower was the second highest in Ireland, but last winter a large portion of the upper part fell, it having been split about twenty years ago by lightning. The compact mortar used by the ancient builders in Ireland is well exemplified in this structure, as for generations the tower leant considerably to one side, nearly as much as the famous tower of Pisa. In some of the old churches, good examples of the sloping cyclopean doorway exist, also some of the characteristic windows of the sixth century churches.

Leaving Kilmacduagh, we go westward for the Burren, and on the rise of ground a few miles out of Gort, the peculiar aspect of the view that suddenly opens on the traveller cannot but impress itself on all beholders. North and south, nearly as far as the eye can reach, is an undulating plain of bare grey rock, backed on the west by rugged hills of huge massive masonry, gigantic steps after steps surmounting one another, and extending for miles to the northward and southward, a natural cyclopean structure. These steps or terraces ought to convince all *Subaërialists* that meteoric abrasion cannot accomplish the work they would make people believe, and any one standing on this rise of ground, must be convinced that atmospheric influences can only have done a small part of the work assigned to them. Opposite him to the west will be the hills of Burren, with their regular systems of terraces, never varying but a few feet in altitude; to the south he will catch a glimpse of the Cork, Limerick, and Kerry hills, in which terraces at similar height occur, although not so regular, continuous, or conspicuous, as those of the Burren. On the south-east are the mountain-groups called Slieve Bernard and Slieve Aughta, and on the north the hills of West Galway and Mayo, none being without these terraces, and some in the valleys of the latter hills being somewhat similar to the parallel roads of Glenroy.

Such terraces in the mountains, some a hundred miles apart, could not have been formed but by a universal denudant like marine action; it therefore appears that if meteoric abrasion had the power some give it, of excavating deep valleys in solid rock, all traces of these ancient sea-beaches ought long since to have disappeared, especially as many of them are formed of gravel and sand.

The steps and terraces of the Burren are not to be matched in the United Kingdom, being more like Arabian scenery than anything else; but what formed them and denuded the country of drift is not quite apparent. On the west coast the Atlantic at the present day is forming terraces similar to those that margin the Burren on the east; therefore we may suppose that such terraces can be cut on an open sea-board; but when we find nearly land-locked valleys similarly circumstanced, the power of the sea to do the work is not so apparent. Nevertheless, as all are on similar levels, we are constrained to believe they must have been formed by similar agency.

The low ground east of the hills may have been denuded of its drift by the current, that at no very remote period swept southward across it. That such a current once existed is evident, as the drift-hills south of the Shannon, between Foynes and Loghill, are almost entirely composed of fragments of rocks from the hills west of Lough Corrib, county Galway; this current, however, could scarcely affect the Burren Hills, and on the Boulder-clay drift seems to be entirely absent, while among them it is only found in a few valleys, and these nearly all in the vicinity of Galway Bay. One reason may suggest itself, on account of the relation between these and other limestone mountains in Ireland,—those of the Queen's County and the county Sligo. In both these groups, as well as in the Burren, the absence of Boulder-clay drift is remarkable, although the neighbouring hills in all cases are more or less covered with it; consequently it would appear that on account of the nature of the rock, when the other hills were covered with ice during the Glacial period, these lime hills were open, leaving them a prey to marine and meteoric abrasion.

We now enter Glen Columbkille, a long wide valley near the west margin of the mountain-group, and separated from the adjoining plain by remarkable roundish hills, a sketch of one of which has already been given (see fig. 59, p. 84, vol. viii.). The view of the valley is from the "Corkscrew," which winds up the steep hill westward of Columbkille cottage, the green field and dark wood of the glen contrasting with the bare rocky terraced hills of limestone; while beyond, in the distance, are the comparatively tame Silurian hills of Slieve Aughta. We may now say a little about the geology of the district.

ASTRANTIA MAJOR IN SHROPSHIRE.

In Science-Gossip for July last (No. 91) is an ingenious article from my sagacious friend, the Rev. J. D. La Touche, who, in touching upon the "Archæology of Rare Plants," has truly observed that the Weo Edge, near Stokesay, Salop, "is the only place in England where the *Astrantia major* grows with any appearance of being indigenous," and has faithfully described the spot. But though Mr. La Touche has pleaded powerfully for the "Roman mason" who was kind enough to bring the *Astrantia* in a bit of pottery from Italy to adorn a garden in Britain, I must be allowed to take a brief on the other side, and disallow the Roman property in the *Astrantia.*

I therefore contend that where a plant has been noticed growing at a particular spot from *time immemorial*, that it is rightly to be considered indigenous to the soil, unless some undeniable fact or accredited statement as to its first appearance there can be adduced, which would settle its position another way. No mere opinion or specious argument founded only on supposition ought to be allowed to prevail against a natural appearance maintained for an unknown time. Suspicion may indeed attach to a conspicuous plant cultivated of old in gardens, like Elecampane (*Inula Helenium*), and other domesticated plants seldom found far from human habitations; and in the case of the mural *Linaria cymbalaria* and *Anacharis alsinastrum*, it is *known* that they are "aliens," and when they were first noticed in this country. But here is a plant found growing freely in several parts of an elevated wood, and near no habitation, having also existed at the locality no one knows how long—the late eminent botanist, Mr. Borrer, thought "for ages,"—and yet we are called upon by Mr. La Touche to come to the "inevitable" conclusion that a "Roman mason" brought the *Astrantia* "in some way" from his native Italy. Instead of this conclusion being "inevitable," I must say that I think it a very weak invention of an enemy to the claim of the *Astrantia* to be a true British plant. Because it is probable, or even provable, that limestone from the Weo Edge was taken to build a Roman villa *six or eight miles off*, it is surely a "*non sequitur*" that plants were in return brought from the Roman villa to the limestone quarry! Had the *Astrantia* been found close to the site of the ruined Roman villa, where there was perhaps once a garden, a more colourable argument might have been urged. But to suppose that "Roman workmen may have settled on this spot"—that is, the quarry on the top of the hill—and "in some way brought the plant with them," seems a most unlikely supposition. Workmen, in general, do not *live* beside the quarry they get stone from; and the Roman who built the villa whose relics have been upturned, was most likely to employ *British* workmen to quarry the stone he wanted—common labourers of the country. That these ordinary getters of stone should have had ornamental gardens close to the quarry, and nourished an Italian flower there for ornament's sake, seems to me the height of improbability. Even that any Roman legionary should have taken such a fancy to the *Astrantia* as to have brought it among his impedimenta across the Alps is quite incredible. Nor is it evident how seeds of the plant could have been brought by Roman soldiers or masons in an accidental way. Many relics of Roman villas have been found in England, as among the Cotswold Hills, and in other places; but no *Astrantia* has turned up anywhere else but on this Weo Edge, in Shropshire. In fact, as far as I know, the Romans have left no vegetable traces of their dominion in Britain, except in the Roman Nettle (*Urtica pilulifera*), found very sparingly on or near old Roman stations as an accidental wanderer; or they may

have purposely introduced the Box and the common Elm.

I see nothing to invalidate the claim of the *Astrantia* to be a true native of Britain in the wood on the craggy Weo Edge. I have often gathered the *Astrantia major* in Switzerland; and it is just in such woody places, at no very great height, that it grows. But then it may be said, that it is curious the *Astrantia* should only be found in Britain upon a single wooded hill in Shropshire. It is so, and this isolation of rare plants in favoured localities is a problem not easy to be accounted for, though it is doubtless a natural phenomenon. Without seeking for examples in foreign countries, though easily adduced, we have in this country various plants that are confined to a very narrow space, and yet their true nativity is admitted without scruple. There is *Potentilla rupestris*, only found on Craig Breidden, Montgomeryshire; *Cotoneaster vulgaris*, on the Great Orme's Head; *Arabis stricta*, on St. Vincent's and Cheddar rocks; *Draba aizoides*, on the Worm's Head and walls of Pennard Castle, Glamorganshire; *Dianthus cæsius*, on Cheddar Cliffs; *Cephalanthera rubra*, on Hampton Common, Gloucestershire; *Isolepis holoschœnus*, on Braunton Burrows, Devonshire; and others that might be mentioned. These plants are all *very restricted* in their range in this island; and I can see no reason or necessity for calling in a Roman mason to plant the *Astrantia* upon a Shropshire hill. It is admitted by Mr. La Touche himself that the location of the *Astrantia* on the Weo Edge "points to the time of its introduction as very remote;" that is, nobody knows how long the *Astrantia* has been fixed in its present position. I prefer going back to a time *anterior* to that of "the Roman mason," and with confidence ascribe the location of the *Astrantia major* on the Weo Edge to natural causes.

Mr. La Touche brings in the evidence of Mr. Bentham as to the *Astrantia* being an inmate of old cottage gardens; but it is not so in this part of the country, and I never heard of an instance of its straying from them.

I ought to say that the locality that appears in Babington's, Hooker's, and Bentham's Floras, of "between Whitbourne and Malvern," for the *Astrantia*, is an error, the origin of which I have in vain tried to trace. Mr. Babington did not himself, as he wrote to me, know the spot, and no Worcestershire or Herefordshire local botanist has confirmed it. Only the Shropshire locality is correct. EDWIN LEES, F.L.S.

POLISHING STONES, &c.—Will any of your readers be so obliging as to give me some information as to the polishing of stones, ammonites, &c.? —*S. W.*

ROSELEAF-CUTTER BEE.

(*Megachile centuncularis.*)

DURING the summer we noticed bees continually under our outside window-blinds, with pieces of leaves in their mouths. They would always ascend the line which drew up the shades, and then pass through the hole where the pulleys were placed. Having disappeared, they would remain for some moments out of sight, descending to the garden in the same manner. If sometimes a bee considered it knew its way well enough without the cord, and ventured to find the entrance, it soon came down from the top of the window and began the good orthodox ascent up the line and through the pulley-holes. The wood-work of the blinds was too closely fitted for us ever to get a peep at what was going on. But to-day, the summer being over, we had our shades down, and in the groove along where the cords ran at the top part of the window we saw the Roseleaf-cutter Bees' summer occupation. Just fitting and rolled up like cigars, we found severa inches of these ingenious nests, about half an inch square. I enclose you a specimen. I have with a penknife gently opened one, and soaked another in water. Then I found, as Réaumur describes, that the bees had taken advantage of the natural curling of the leaf on drying, and had not needed any gluten to fix the cut pieces. Each separate nest had one rounded end, which fitted into the convexity of the other; so that on first seeing the strange green roll I thought each join denoted a day's work. Having broken off one compartment, I proceeded to lift off the outer coverings,—there were nineteen pieces; then I lifted off the rounded end which closed up the mouth,—there were twenty of these exact, neat rounds, beautifully moulded into shape. Within this warm nest was a quantity of soft pollen and honey; then a hard case, in one instance, with burnished inner walls, in which lay a white soft maggot or grub; in another this hard cell was wanting. There were in all twenty-four nests, the leaves still retaining their green. I have read that this bee generally digs in the ground to build its nest; here, just above the rose-bed over the window, we found our summer lost leaves. Have your readers met with buildings in similar localities? Can you also tell me if one bee would make more than one nest; and if the worker is the parent of this concealed white plump grub?

Chatham. A. YOUNG.

GALLS USED AS FOOD.—Tournefort states that at Scio the galls of *Salvia pomifera*, L., are collected for the purpose of making a kind of sweetmeat of them. According to Lesson, the same might be done with those of the Ground Ivy (*Glechoma hederacea*, L.).—*Moquin-Tandon*, "*Medical Zoology.*"

A FEW OBSERVATIONS ON THE SMOOTH NEWT.—No. 2.

(*Lissotriton punctatus.*)

HAVING given, in a recent number of SCIENCE-GOSSIP, a short description of the eggs and very young tadpole of the Smooth Newt, I shall now add a few observations on the habits and food of the adult female Newt while in confinement.

As was previously stated (page 127, last vol.), I obtained the Newt in the end of May, and it was in my possession until July 20th, in the evening of which day it clambered up the side of a small aquarium, in which I had put it for the purpose of closer examination, and escaped; and, notwithstanding a long and careful search, was never seen again. This was the more remarkable as its escape was soon discovered, and it would find some difficulty in making an egress into the open air. During this period it spawned, and, to my knowledge, twice cast its skin. The first time was on July 16th. When I first observed it, the old skin from off the head was lying on its neck, much resembling a piece of soiled gossamer twisted around it; in a short time it had got it down to the hind quarters; and on again looking some time after, I found that it had divested itself of it altogether, and that the cast skin was nowhere to be seen. The upper web of its tail was now wholly gone; the under one nearly so. When got, both were well developed.

On July 19th it again cast its skin. This time I saw the whole operation, which was both interesting and curious. On first observing it, it was rushing wildly about amongst the roots of the plants and stones at the bottom of the aquarium, apparently attempting in this manner to get rid of the old skin, which was now, as in the former instance, lying on the neck like a piece of ravelled gossamer. In a few minutes it succeeded in getting it down to its hind legs, when it immediately turned round, and, seizing the skin in its mouth, divested itself of it altogether, drawing out the feet and tail, and leaving the slough in the exact shape of these members. It had no sooner got rid of the old skin than, still retaining its hold, it commenced making a meal of it, and had it not been for the colour, one might easily have imagined it devouring one of its own species, so like the real reptile did the slough of the hind legs and tail look, as, still distended and of the natural shape, it slowly disappeared down the Newt's throat! From the time it was got until June 17th I never observed it show any inclination to be out of the water, or even to remain at the surface, generally swimming about or resting among the plants. When wishing to breathe, it would rise to near the surface, and, after a few moments' rest, suddenly jerk its head above the water, withdrawing it again as quickly. Sometimes it swam with ease: at other times it appeared to have some difficulty in rising to the surface clinging to the plants to aid its upward progression. Once when the water was renewed we were obliged to take it out of the aquarium, as it could *not* rise to the surface, and appeared to be completely exhausted with its fruitless endeavours. This I thought might be owing to the change of temperature, as nearly all the water had been drawn off and replaced with fresh, which would be considerably colder; the temperature in which the aquarium is kept being comparatively high. In the evening of June 17th I observed it on the highest point of the piece of rockwork, out of the water. It appeared in the attitude of listening, with the head a little inclined to one side, and the throat moving rapidly and continuously, and remained so for a considerable time. There was thunder in the air at the time. Was this strange behaviour consequent on atmospheric influence? Hence, until the 9th July, it often showed considerable anxiety to be out of the water, and was so most part of several days. During this period the weather was very changeable, with a good deal of thunder.

I will now give the few notes on the subject of its food, as noted down in diary, premising, however, that up to the commencement of those notes its food had consisted of small earth-worms: June 8th.—The Newt not having had any worms for the last few days, appeared viciously hungry, snapping at the tadpoles' tails as they passed its ever-changing lair amongst the plants. One of the tadpoles had lost half of its tail, and several more their tail-tips, which I conceived must have been bitten off by the Newt. Taking it out of the aquarium, I placed it in a basin, putting in at the same time a worm, which it soon discovered, and, seizing it by one end, swallowed it in a series of jerking gulps. Immediately prior to this I had, on two several occasions, put into the aquarium small earth-worms. It did not, however, as usual, take them, although evidently aware of their presence; its vision was apparently, circumscribed. June 10th.—To-day it seized a piece of raw lean mutton, which had been put in for the tadpoles, and attempted to swallow it, but it being too large, was obliged to disgorge it again. Once before it swallowed a piece of gristle which had lain in the aquarium several days, and was much attenuated by the tadpoles feeding upon it. Hence, until June 23rd, it was fed on worms, and raw and cooked mutton. The meat I cut into long thin pieces, worm-like, and which it readily took from the points of a pair of scissors, discussing it in the same manner as it did a worm. June 25th.—Very active to-day; more so than usual. It hunted a tadpole (frog) which had got all its legs, and consequently was less active than its fellows. Once it caught it by one of the hind legs, but, after severe struggling, the tadpole managed to escape; again it

was caught, and again escaped, the Newt being unable to retain its hold. At length, however, being seized by the head, it was powerless, and was shortly gulped down its captor's throat. All the time that the Newt was hunting, it snapped viciously at every tadpole that came in its way, but only hunted this one, obviously knowing where the best chance of success lay, as the rest of the tadpoles, not having got their fore legs, were much more active. It was very cautious and deliberate in its movements, and the pursuit of its prey lasted a considerable time. On subsequent occasions the hunt was repeated, though not always with like results. The last time I observed it, after capturing its prey and gulping it down so far that the toes of the hind feet were just protruding beyond its lips, it disgorged it, probably from its being too big a morsel, its body being almost as large as the head of its captor. The Newt appeared considerably crest-fallen, nor was it ever again seen in the same pursuit.

In concluding these few observations on the Smooth Newt, which I trust may not have been wanting in some interest to the readers of SCIENCE-GOSSIP, and especially to those possessing aquaria, who might, with a little care, have an interesting addition to their aquaria for, at least, a portion of the year in this small Newt, I will give a short description of its appearance at two periods distant from each other over six weeks :—

As taken on June 4th.—Colour: Whole of upper part, from tip of nose to end of tail, an ashy-grey green; under part of body greyish-white, with a band of orange along the belly from the breast, and continued along the under side of tail to end of fin; a light spot on each side of tail, at base, above origin of hind legs; throat light, with a fleshy tinge; eyes brilliant, black, with golden-coloured irides; the fore feet and legs slender; hind legs stronger, and feet broad and flat, with five toes on each foot. The front feet only possess four toes on each.

As taken on July 20th, having on the day previous cast its skin.—Upper part of body olive-brown, of tail brown; belly bright orange, more so than when last described; sides of belly dirty white, with brown spots: a few spots also being underneath. The whole body is, more or less, sprinkled with spots, which, however, are less distinct on the upper parts by reason of the darker colouring of those parts. The spot on each side of the tail, at base, is less distinct. Below the eye, from the hind part, running backward, is a straw-coloured streak. There was, when obtained, a protuberance at the anus, which has entirely disappeared.

In my former paper (page 128, vol. viii.) I omitted to state that the elongated form of the eggs, figure 93, *b* and *c*, was due to the efforts of the inclosed tadpole at liberation. They are as seen just before hatching. The upper anterior part of the tadpole, 93 *c*, is slightly imperfectly delineated.

ERRATUM. — At page 128, first column, and twelfth line from bottom, instead of June 12, read June 22. C. ROBSON.

Newcastle-upon-Tyne.

THE GARDEN WARBLER.

(*Sylvia hortensis.*)

OFTEN called Garden Fauvet, Greater Petty-chaps, or Billy Whitethroat, is five inches and three-quarters in length; upper parts greyish-brown tinged with olive, the under parts greyish-white, tinged with a rusty brown at the breast and sides. The breast of this bird is whiter after every moult; the same I have noticed to be the case with the Nightingale and Blackcap Warbler.

The Garden Warbler is very like the Blackcap in form and size, and inhabits the same districts. It is not confined to the southern counties, as some naturalists have stated. It may be heard every summer in Spindlewood, near Kendal, and in other localities in Westmoreland. It arrives here seldom before May, and prefers groves, orchards, and bushes; but its song may be heard far more frequently than it itself may be seen, as it loves to perch on the top of some tall tree embosomed by leaves, or from the cover of some thickset hedge, whence it sends out its soft and silvery notes, which equal the Blackbird's in melody; and, though not so wild and thrilling as the Blackcap's, exceeds the latter in that ineffable sweetness which is impossible to describe.

From the exquisite choice the Garden Warbler generally makes of a station for its nest, one is at once reminded of the lines in Keats's "Ode to a Nightingale."

So charming to the ear is the song of this bird, that I am irresistibly compelled to quote from Wilson's American Ornithology some expressions used respecting a bird of the New World, and which are quite as applicable to the Garden Warbler. "When every object around conveys the sensation of joy, and heaven's abundance is as it were showering around us the grateful heart-beats in unison with the varying elevated strains of this bird; we listen to its notes in a kind of ecstasy as a hymn to the great and most adorable Creator of all. Abject must that heart be, and callous those feelings, and depraved that taste, which neither the charms of Nature, nor the melody of innocence, nor the voice of gratitude and devotion can reach."

Mr. Keuleman says this bird in Spain is very tame, and often builds its nest on the window-sill in the suburbs of the towns; but in England its habits are shy and retiring; it is constantly flitting about with great agility. When hopping from twig

to twig, the close observer will notice it always alights with a peculiar jerk of the body from one side to the other. It feeds chiefly on small caterpillars, moths, and butterflies, and is also a great devourer of small fruit, such as red currants, raspberries, strawberries, and elderberries; in the cherry season its beak is generally stained with cherry-juice. The nest and eggs are scarcely distinguishable from those of the Blackcap: it is the true Beccafico of the Italians, and by them it is killed and eaten in large quantities.

In confinement this bird, though more easily tamed than the Blackcap, is a more tender bird, rarely living more than four or five years. All that I have said concerning the Blackcap on page 79 of the last volume applies equally well to the Garden Warbler. In addition to the food there mentioned, there should always be a tin of raspberry or red currant jam in its cage; it is also fond of boiled green peas, grape-juice; and a piece of lump sugar in its water is a great treat to it. In the moulting season give it mealworms or ants' eggs every day; it is very fond of elderberries, which may be dried in the season, and then kept all the year round; and when wanted, boiling water must be poured on them, and when cold drained off, and in this way they swell out, and are as good as fresh berries; dried ants' eggs may be treated in the same way.

If fed on little but rusk sop, its feathers fall out, and in winter it dies of starvation; it should have plenty of variety, and if well fed and cared for, it will sing almost incessantly from November to June. It is more susceptible of cold than any other cage bird, and continued wet weather has a very marked depressing effect upon it. In warm weather a bath three or four times a week may be given it, but in winter this must not be given, as the bird would be seized with cramp, and die in a very short time.—*J. S. Metcalfe.*

THE ECONOMY OF THE FRESH-WATER POLYP.

In the June number of Science-Gossip, 1872, page 132, was published (with illustrations) a communication from me on the above subject, in which I endeavoured to describe what I had observed of them. The question that arose in my mind at the time, as to what the nature of those objects was, seen to spring out with considerable force from certain protuberances on the body of the Hydra, has been satisfactorily answered, and proved to be spermatozoa. As the power of my microscope was not great enough to define their form, I could only discern them as very minute and indistinct particles. I therefore gave some of the polyps to George Gulliver, Esq., F.R.S., and he examined them under an objective (Powell & Leland) of one-tenth of an inch focal length, and found the spermatozoa very active.

Mr. Gulliver estimates the mean length of each spermatozoon at about $\frac{1}{8400}$ of an inch. I have continued to follow up the study of these interesting animals, and on June 1st, last year, I had a number of *Hydra viridis* in my aquarium, and on closely examining some of them, I observed on them the same form of sperm-cells as those I had seen on *H. vulgaris* in December, 1871. On placing them in a shallow glass cell by themselves, I had the pleasure of witnessing the rupture of the sperm-cells as I had previously done on *H. vulgaris:* also I noticed, June 7th, a peculiar rising or swelling on the lower part of the body, quite different in appearance from the sperm-cells, or from the appearance when budding or gemmation is about taking place (fig. 11). On seeing this peculiarity, I kept them

Fig. 11. Commencement of swelling on body of Hydra.

Fig. 12. Ditto increased to formation of ovi-sac.

almost constantly under observation with the microscope, and saw the various progressive changes that took place in the development of the ovi-sac, for this it proved to be (fig. 12). The sperm-cells were on the same Hydra; the full development of the ovi-sac took three days from the first appearance of the swelling on the body, until its separation from it as a perfect globe (fig. 15), when it sank to the bottom of the glass. I was reluctantly obliged to forego any further investigation, as I was away from home for fifteen days; but previously to leaving I sank the glass cell with its contents in a white shallow pan, under a glass shade. On my return I found that the globe-shaped ovi-sacs which I had seen issue from the Hydras, had disappeared, and spread over the bottom of the white pan were a few very minute Hydras; indeed, so small as not to be detected without a glass, and so transparent that,

under the microscope, the green granules (which in the adult Hydra appear a mass of green) could be counted. These had the appearance of beads strung together; each had only four tentacles (fig. 13).

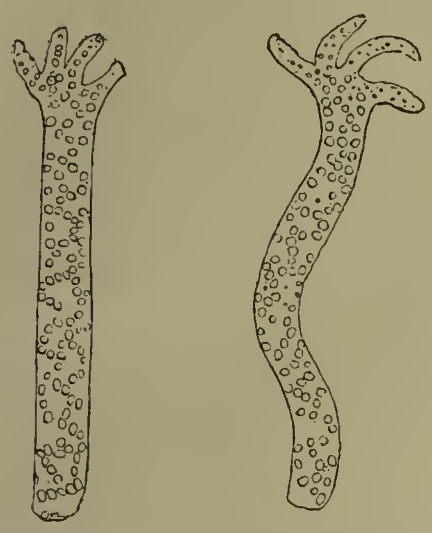


Fig. 13. Young *Hydra viridis*, a few days after leaving the ova.

It now remains to prove in what form the young Hydra first appears on leaving the ova. I do not think it has at first the perfect Hydra form, but in all probability is that of a minute grub having no tentacula. In course of time these grow out

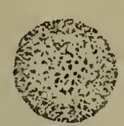
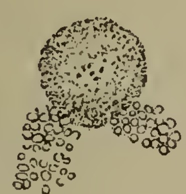


Fig. 15. Detached Ovi-sac.



14. Parasite of *Hydra*. Fig. 16. Bursting of Ovi-sac.

gradually, as is the case when they increase by gemmation or budding; the first form is a lump, which slowly grows out a certain length, and then the tentacles make their appearance, one or two at the first; and these gradually increase in size and number to the perfect form. Thus those young ones I found at the bottom of the pan had not the exact resemblance in form of the full-grown Hydra, but were uniform in the size of the body, as seen in fig. 14, and with only four very short tentacles, whereas the usual number on the matured *H. viridis* is from seven to twelve. There is this particular difference between the *H. vulgaris* and *H. viridis*—whilst the ova of the former are produced in the autumn months, and are supposed to sink to the bottom of the pond, and are hatched out in the following spring, the latter, on the contrary, produce both sperm-cells and ovi-sacs at the beginning of summer, and, according to my observations, all are hatched out in about fourteen days. From that time up to October they have kept increasing by gemmation, and no doubt also from the ova in the vessel I kept them in. On July 9th, 1872, I found one more of the *H. viridis* with the ovi-sac forming as before, but the Hydra was infested with a number of parasites, which ran over every part of the body with a quick motion, and also attached themselves to the ovi-sac after it left the body of the Hydra (fig. 14). I watched with increasing interest the globe-shaped ovi-sac, to see it discharge its contents. I had the good fortune to witness this, and I hoped to have been able to trace the development from the ova (which I believe has never been accomplished yet). But I was doomed to be disappointed, though I saw the ovi-sac burst (as shown in fig. 16). I had the mortification of seeing these said parasites devour the contents entirely, and that with apparent eagerness.

Fig. 17. Spermatozoa of *Hydra*.

They moved with greater rapidity as they were devouring the minute granules that escaped from it, which, in the course of two hours, had almost entirely disappeared. I saw the spermatozoa issue from the cells both before and after (the ovi-sac, in this instance, was separated from the Hydra's body), and I carefully preserved for two months the water in which it took place, daily looking for a Hydra, if any had escaped the voracity of the parasites, but not one appeared; still I hope at some future time to be able to trace the development from the ova.

It has been matter of dispute whether the Hydra has the power of stinging or benumbing its victims; but this is now generally admitted, and I think there can be no doubt about it. I have seen the small red worm, and also the larva of gnats, die instantly they came in contact with the tentacles of the Hydra. The water-flea, *Daphnea pulex*, on the contrary, will for some short time maintain a struggle with the Hydra: its shell partially protects it from the immediate effects of the poison. Still it seldom disengages itself from the grasp of the Hydra, and, when it has done so, I have seen it in a very short time sink to the bottom of the water and die, evidently from the effects of the stinging. This stinging power is owing to the presence of certain fine threads contained in the numerous tubercles

with which the tentacles are thickly beset, called urticating threads, which the animal has the power of pushing out at its pleasure, thereby rendering the surface of the tentacle rough, and giving a firmer hold on its living prey. I have, by pressing a Hydra between two pieces of glass, forced out

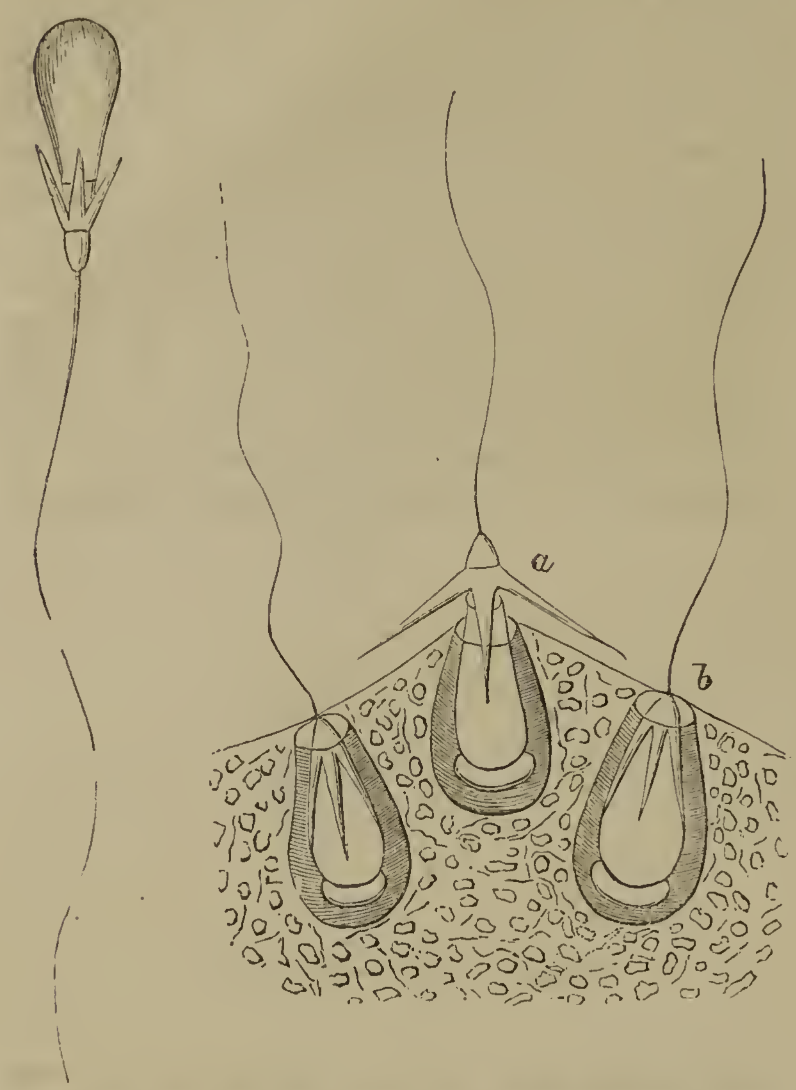


Fig. 18. Stinging Organ of *Hydra vulgaris* when pressed out of vesicle.

Fig. 19. Arrow-headed stings projected out of vesicle: *a*, recurved hooklets expanded; *b*, ditto at rest.

these urticating threads from the vesicles, together with the three recurved hooklets attached, by which the tentacle is rendered so powerful an instrument of retention, and have them dried out and mounted for the microscope (fig. 18). The hooklets are clearly and distinctly seen when first pressed out and before they are dried, but are not so plainly seen after, as they close down in their natural position of rest.

In fig. 19 is given a rough sketch of the way in which the arrow-headed sting is projected out of the vesicle in connection with the urticating thread, which gives the power to the Hydra of holding the struggling victim. I have often wondered at the tenacity with which the Hydras maintain their hold on a water-flea, when perhaps only the extreme end of the polyp's tentacle at first has come in contact with the very fine antennæ of the flea, and the flea has endeavoured to escape by its characteristic violent jerks, and I thought them to be powerful enough almost to break the tentacle itself. But the tentacle is thickly set with these arrow-headed stings (fig. 19, *a*), so that when the animal puts forth a number of them it is easy to see how difficult it would be for its prey to escape its grasp. These threads must of necessity be composed of something very different from the other parts of the Hydra, for they continue visible under the microscope after the other parts of the body are dried up or dissolved.

The parasite on the Hydra was observed more than a century ago by Trembley, who made the Hydra his special study. He calls them lice, and observes that they sometimes kill the Hydra; and he gives some curious instructions for ridding the Hydra of them.

I have often remarked that on the death of the Hydra, and after it has been left to decompose in the water, a large number of minute animalcules spring into existence, and surround the dissolving parts of the body, evidently consuming it; but they are much smaller than those described as parasites, and of a different form. In the "Micrographic Dictionary," plate 24, is figured, No. 30, *Stylonichia lanceolata*, with side-view of the same, which appear to me, when compared with those described as parasites, to be the same; if so, they are not exclusively the parasites of the Hydra, but may be found elsewhere. Still I have never observed any of the other forms of Infusoria infesting the Hydra.

Canterbury. JAMES FULLAGAR.

MICROSCOPY.

REVOLVING "DARK WELLS."—The following modification of the ordinary "dark well" I find very useful in the examination of certain opaque objects with the Lieberkuhn, or Parabolic Illuminator. The following diagrams perhaps scarcely need explanation. A is a front view of the "wells" as

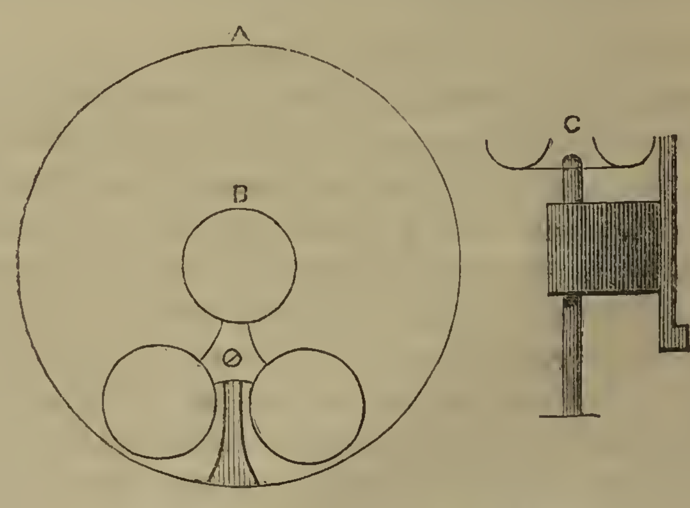


Fig. 20. Revolving "Dark Wells."

fitted to a short tube made to slide into the sub-stage tube; B, the wells; C, section of ditto. The "wells" differ somewhat from the ordinary form, being slightly concave discs instead of short tubes; the concave surfaces of the discs I colour respectively emerald-green, pale blue, and black. With dark

semi-opaque objects the green is very effective, and adds materially to the stereoscopic effect when the binocular is used. The same sized well that is used with a two-inch will work with any objective up to a two-thirds. Another advantage connected with the revolving wells is the facility with which an object can be examined by transmitted light. A word or two on the management of the Lieberkuhn: This very useful adjunct has of late years been somewhat neglected for other methods of illumination. My experience (over twenty years) leads me to prefer it to any other kind of apparatus; the glare produced by it, and of which many microscopists complain, may be got rid of by throwing the mirror out of the centre, and thus throwing up an oblique pencil of light; the object will then have a brighter beam of light on one side than the other, and elevations or depressions will come out with great distinctness.—*F. Kitton.*

Dyeing Wood Sections.—I hope that one of the following solutions will suit "J. R." Dr. Beale's carmine solution: "Carmine, 10 grains; strong liquor ammonia, half drachm; Price's glycerine, 2 oz.; distilled water, 2 oz.; alcohol, ½ oz. The carmine, in small fragments, is to be placed in a test tube, and the ammonia added to it. By agitation, and with the aid of the heat of a spirit-lamp, the carmine is soon dissolved. The ammoniacal solution is then to be boiled for a few seconds, and allowed to cool. After the lapse of an hour, much of the excess of ammonia will have escaped. The glycerine and water may then be added, and the whole passed through a filter." Thiersch's fluid is composed of two solutions: No. 1. Carmine, 1 part; caustic ammonia, 1 part; distilled water, 3 parts. No. 2. Oxalic acid, 1 part; distilled water, 22 parts. These solutions to be mixed in the proportion of 1 to 8. When thoroughly mixed, add absolute alcohol 12 parts; allow the whole mixture to stand four or five hours, and then filter. Thiersch's lilac-colouring solution is composed as follows: Carmine, 1 part; borax, 4 parts; distilled water, 56 parts. "The red solution is to be mixed with twice its volume of absolute alcohol and filtered. The precipitate of carmine and borax is re-dissolved in distilled water, and is ready for use." The sections to be dyed should be placed in a watch-glass, with a few drops of one of the solutions for a day or two, when they should be carefully washed in distilled water, and are then ready for mounting.—*T. C. T. Walrond.*

Bunt of Wheat as a Lens.—"A. M., Paris," may show the image in any beetle's eye that is well mounted as a transparent object. If he does not possess one, he should select a beetle whose eyes have large ocelli, and macerate its head in water or *liquor potassæ*, until the membrane bearing the corneules can be easily removed. This should be well washed in pure water, cleaned with a camel-hair pencil, and dried between two slips of glass under pressure. Even in this dry state the lenses will show the image; but it is better to mount the eye in Canada balsam, which, by lengthening the focus of the lenses, increases the size of the image. The eyes of almost any insect treated in this manner will show the image more or less perfectly. The ocelli of the *cicadidæ* being large, are well adapted for the experiment, but the eyes of the *coleoptera* are, perhaps, the most easily managed, and most certain in action. To show the image, the slide containing the mounted eye or the bunt of wheat, should be placed on the stage of the microscope, and focussed with an objective of about ¼-inch focal length. A small object having a well-defined outline should then be moved about between the stage of the microscope and the source of illumination, until its shadow is seen dimly through the lenses. It may then be brought sharply into focus by moving the objective *away* from the slide if the insect's eye be used, or *towards* it for the bunt of wheat. The effect is much improved if an achromatic condenser be used below the stage, or an objective of low power may be substituted for the condenser. Some microscopists fasten underneath the stage a blackened pasteboard tube, having at its further end an arrangement for holding glass slides, on which various designs have been drawn or photographed. A portrait thus shown is interesting from its stereoscopic appearance, as well as from the number of times it is repeated. Sometimes a hole is cut in the side of this tube to admit of a strong light being condensed on an opaque object, which is also well shown by the lenses. If "A. M." still finds any difficulty, I shall be glad to send him a slide or two, and any further particulars he may require.—*F. W. M.*

Bone-dust in Soap.—Those of our readers who have experienced an irritating effect in the skin after the use of old brown Windsor soap, can, by applying the microscope to the soap, detect the presence of fine particles of ground bone, which have not been separated from the fat of which the soap was made. These particles are abundant in the cheaper kinds of soap.

Monochromatic Sunlight.—Mr. J. E. Smith, of Ohio, has obtained light with which he is perfectly satisfied by means of a light sky-blue and dark green glasses. He prefers to use one blue glass combined with two or three green ones, the best shades being ascertained by trial. Several such sets, of different depths of colour, may be mounted in a series, like magic-lantern pictures, so that either set can be brought easily over the hole in the shutter. By sunlight transmitted through a com

bination of such glasses, and without condenser or apparatus of any other kind, he can resolve all the shells of the "Probe Platte" with ease. He considers the light thus modified as good as the more nearly monochromatic lights of the troublesome ammonio-sulphate cell.

Mounting in Balsam (No. 96).—Mr. Kitton's reputation as a microscopist is too well known to me to permit me to gainsay his remarks on mounting in balsam; at the same time I have met with tolerable success in mounting with fluid balsam, and I have found that if carefully prepared with benzole it will, in time, harden under the very centre of the covering glass (of course, the larger the object and glass the longer this will take); I have taken off the covering glass of one or two duplicates in my cabinet to be assured of the fact. For my own part, I do not like using chloroform, as I think it renders the balsam liable to get cloudy. Dammar, I find, when old, is liable to chip from the glass cover, or flake off from the slip; nevertheless it is very useful for objects that are small. I have made many experiments in compounding media, and have tried a vast quantity made by others, and, after all, I have found that no medium is so well suited to my general requirements as balsam (of course, I do not include glycerine, or some of the solutions which are absolutely necessary for some classes of objects). In the end, is it not probable that each would-be preparer of objects has some pet method which he considers superior to any other, and which is rarely successful when adopted by others?—*E. P. P.*

ZOOLOGY.

Blind Spiders.—In the December number of the *Annals and Magazine of Natural History*, the Rev. O. P. Cambridge has described two new species of spiders from Ceylon. They are perfectly blind, and are found among decayed leaves. The Cave spiders have long been known as eyeless, having become blind through disuse of the eyes in the course of many generations; it is believed that in this case it has been so through the spiders being hidden from light under the decaying vegetable matter. The name of *Nyctalops* has been given to the new genus.

Insect Pests.—The worst enemies of the naturalist and taxidermist are two species of beetles, the *Dermestes* and *Anthrœnus*, which in their larval state, in the form of worms covered with hairs, commit great ravages wherever there is any animal substance. The skins of birds and animals are quite destroyed before their attacks are suspected. The ligaments of small skeletons, horns, and hoofs soon show the presence of these animals by the dust which falls from their gnawings. Whole collections of insects are reduced to dust-heaps in spite of camphor, tobacco, and similar substances. The only way to kill them is by baking the specimens which contain their eggs above 160° Fah., which will coagulate the albumen and destroy them. To prevent their attacks, skins and ligaments should be thoroughly poisoned with arsenic, and insects should be hermetically sealed.—*Journal of Applied Science.*

Scotch Pearls and Bridges.—It is a popular theory in Scotland, that "the building of bridges diminishes the number of pearls in the rivers." At first sight this seems very much like making Tenterden steeple responsible for the existence of Goodwin Sands; but the naturalist finds a basis of scientific truth in the apparent *non sequitur*. Before the bridges were built, the cattle in fording the streams trod upon the mussels, and the injury done to the shells caused the formation of pearls; but now that the cattle cross by the bridges, the secretion of the pearls is no longer promoted in that way. The peasant could observe the fact, though he could not give the philosophy of it.

John Keast Lord.—It is with much regret that we have to announce the death of Mr. J. K. Lord, one of our oldest and most esteemed contributors. Some months ago Mr. Lord was laid up with a severe attack of paralysis, which has resulted fatally. In the Crimean war Mr. Lord served as captain in the artillery, and took part in the battle of Balaclava. Shortly after the close of the war he spent some time in Vancouver's Island, the results of which he afterwards published in his *Naturalist in Vancouver's Island*. He also acted as naturalist in the North American Boundary Commission. At the time of his death he was manager of the Brighton Aquarium.

The Young Hippopotamus.—At a recent meeting of the Zoölogical Society of London, Mr. A. D. Bartlett read some notes on the birth of the hippopotamus which had been announced at the previous meeting of the society. Mr. Bartlett called particular attention to the fact that on one occasion the young one appeared to have remained under water without coming to the surface to breathe for nearly fifteen minutes, and also pointed out that this was the first instance of the hippopotamus suckling her young in captivity.

How are Eels Bred?—Aristotle says they are bred from mud. Pliny believed that they rubbed off portions of their bodies, and that these fragments became perfect animals. Horsehair from a stallion's tail when placed in water was (and perhaps still is) believed to produce them. Professor Hunter made some beautiful drawings of the

sexual organs of eels (now in the College of Surgeons). At certain seasons of the year the milt and ova may always be found. If the stomach of an eel is opened, two narrow sacs running on each side of the air-bladder and extending the length of the abdomen, will be seen and continued past the anal orifice on the inner surface of the membrane forming this tubular sac. The milt in the male is secreted, and the ova attached in the female. One edge of the membrane is attached to the membranous lining of the spine, the other is free, and appears puckered or plaited like a frill. The caudal heart, or rather pulsating vesicle, of the eel forms a very interesting microscopic object. It may readily be seen in the tail of a young eel about four or five inches in length. I have found the best way to examine it is to place the eel in a weak solution of chloral, and when it becomes motionless put it in a glass trough filled with water; it will remain quiescent for half or three-quarters of an hour. The above plan is the best way to quiet the newt and frog tadpole: the circulation in the branchiæ of the former when rendered motionless is a sight worth seeing.—*F. K.*

English Anchovies.—In an interesting and suggestive paper read before the East Kent Natural History Society in November, Dr. Gulliver stated the Anchovy (*Engraulis encrasicolus*) was much more abundant in the seas off the southern coasts of England than has been supposed. During a recent visit to Devon, Dr. Gulliver has seen many anchovies lying among the young herrings, which might have been collected for potting, sauce, or pickling. He thought this was an instance of the many too well-known examples of the waste of our fish, and of the neglect of what might be made a profitable branch of native industry. Mr. Couch had previously shown that this fish abounds off the coasts of Cornwall towards the end of the summer, and that well-known ichthyologist had suggested that if attention were paid to them, sufficient might be caught to supply the consumption of the British islands.

Distribution of Insects in different Localities.—I have recently been impressed by a curious circumstance which perhaps other collectors of *Lepidoptera* may have noticed. When beating or searchin for larvæ, there is more difficulty in obtaining them sometimes just in those localities where they might be expected to be more numerous. Thus, in the Kentish roads, twenty or thirty miles from London, the result of a few hours' work in pursuit of larvæ will be less than in a locality seemingly more unpromising, as, for example, Wimbledon Common. I imagine the reason is this: in an extensive wood, caterpillars will be unequally distributed; the parent moths take fancies for certain spots, and deposit eggs there by preference; so that one may hunt a good deal, and yet may not chance to hit upon the best places. But at Wimbledon, and other resorts of insects nearer London, the various food-plants are limited in quantity, and therefore the moths and caterpillars are, as it were, concentrated about these.—*J. R. S. C.*

A Means of Capturing Moths.—I am informed by a friend that a tolerably successful mode of securing individuals in wood-ridings, or other narrow avenues where there are trees on each side, is to hang a white sheet across in a good position. The entomologist stations himself beside it with his net in the dusk, or even by day. Many moths will settle upon it at various elevations, and they may thus be boxed or netted; others flying across are seen reflected upon the sheet, and are more easily captured. In some cases the insects seem dazzled or bewildered by this object, and do not exhibit their usual agility in escaping.—*J. R. S. C.*

BOTANY.

Littorella lacustris.—I am not sure whether Mr. Hind (Science-Gossip, Oct., 1872, p. 231) considers this plant as extinct; but Bentham speaks of it as apparently widely distributed, and it is abundant near here.—*B. J. Austin, Reading.*

Littorella lacustris.—I see by a notice in your last number that the *Littorella lacustris* has been found this summer in Ruislip reservoir, the last *recorded* discovery of the plant being so long ago as 1805. This plant was found by my son, now the Rev. R. M. Stewart, near Porthleven, Cornwall, in the year 1865. I have the specimen, which was an excellent one, and is still in very good condition.—*L. Stewart.*

Epipactis latifolia.—I saw a good many fine plants of this somewhat rare orchis last summer in the lower part of the Crystal Palace grounds, Sydenham. Though I have passed the very spot scores of times during the last few years, I never observed it before, though I feel sure it must have been growing there for a considerable time.—*H. E. Wilkinson.*

Epipactis palustris.—The notice by "Al. I." of the discovery of a station for *Epipactis palustris* between Mortlake and Kew recalls to my mind a similar instance of its occurrence in another part of Surrey. The extensive hilly district of Hindhead contains numerous valleys, consisting of wet, marshy meadows drained by small rivulets. In one of the meadows was a small patch of ground, lying at the confluence of the rivulet and a side drain, which was of a more distinctly *fenny* nature than the rest of the meadow, it being so wet that sphag-

num had nearly choked the grass. Here in a triangular space, not four yards long, *Epipactis palustris* was growing in some plenty, accompanied by *Gymnadenia conopsea;* and although the latter plant was to be found in many parts of the meadows, not a single plant of the *Epipactis* occurred anywhere else. I prefer not to give the exact locality. Here, in Norfolk, where it abounds in the fens, such reticence would be unnecessary.—*C. G. Barrett.*

The Ophrys apipera in Herts.—This rare plant grows in considerable quantity in certain localities in Herts; but from my own observations, it is more plentiful on banks of the Great Northern Railway than in any natural locality. I suppose that the seeds of the plant were either sown with the grass with which the banks are covered, or that it was brought with the earth that composes the banks. I am sorry to say that some of the localities have become known to some persons who gather it, roots and all, most unmercifully. In spite of this the plant came up this year with tenfold abundance, almost covering the ground in some places.—*Thomas Bates Blow, Welwyn, Herts.*

Mistletoe on the Oak.—At the meeting of the Worcestershire Naturalists' Club, in October last, Mr. J. Twinberrow announced the discovery of a second mistletoe oak in the county, at Lindridge, near the Shropshire boundary. This, says the *Journal of Botany*, makes the fourteenth known example in England.

Potentilla fruticosa.—In answer to your correspondent "A. J." 28, Upper Manor Street, Chelsea (S.-G., Dec. 1872, p. 278), I can affirm *Potentilla fruticosa* does grow on the north bank of the Tees in this neighbourhood. It is, perhaps, thirty years since it came under my notice, but I have seen it at intervals down to the present time. Keeping no note-book, I cannot say at how many stations I have gathered it; at one only could I be certain of finding it, where the plants are stunted, being rooted in the fissures of the mountain limestone. I am pretty confident more stations could be found if a search were instituted. Eggleston Abbey is about one mile below here, and Thorp three miles further, both on the south side of the river, at neither of which places have I noticed it. The only thing worthy of a passing notice at the latter place is a station for that handsome member of the Geranium family (*Geranium Pyrenaicum*), the only one I ever met with. Winch Bridge, High Force, and Widdy Bank are the head quarters for the above-named Potentilla. Had your correspondent visited the last-named locality about the end of April, he would have been introduced to as great a rarity in *Gentiana verna*. As I have not a London catalogue, I cannot say which is the greater rarity of the two.—*J. Maughan, Barnard Castle.*

GEOLOGY.

A New Trilobite from the Cape of Good Hope.—At a recent meeting of the Geological Society of London, Mr. Henry Woodward, F.G.S., described a new species of Trilobite from the Cock's Comb Mountains at the Cape of Good Hope, which had been preserved in a nodule, the impression retained in which, when broken, furnished the most instructive details as to its structure. Each of the eleven thoracic segments was furnished with a long median dorsal spine, giving to the profile of the animal a crested appearance. On each side of this the axis of the segment bears two or three tubercles, and the ridge of the pleura four or five tubercles. The tail is terminated by a spine more than half an inch in length, and all the spines are annulated. For this Trilobite the author proposed the name of *Encrinurus crista-galli*, although with some doubt as to the genus, the head being only imperfectly preserved.

New Tertiary and Post-Tertiary Birds.—Some new species of birds were found by the Yale party during their explorations of last year in the lower tertiary strata of Wyoming. We give the following descriptions, and add an account of a few species of interest from the post-Pliocene of the Atlantic coast. The *Aletornis nobilis*, new both in species and genus, was a large wading bird, nearly equal to the flamingo in size. It is indicated in the collections by the distal end of a tarso-metatarsal bone and by a few other fragmentary remains. The *Aletornis pernix* is a smaller species of the same genus, represented by portions evidently belonging to one skeleton. It was about as large as a scarlet ibis. Another species of wading birds apparently belonging to the genus *Aletornis* is indicated by the distal part of a tibia in perfect preservation, showing the bird to have been of about the size of a curlew. The *Aletornis gracilis* was another small aquatic bird, not larger than a woodcock. It is represented in the Wyoming collection by the proximal end of a humerus in excellent preservation, and by some less important remains. A diminutive species of about half the size of that just mentioned is the *Aletornis bellus*. The remains found somewhat resemble similar bones in the kill-deer plover. A small bird belonging to the *Scansores*, and evidently related to the woodpeckers, is termed the *Unitornis lucaris*, and is represented by the distal end of a tarso-metatarsal in perfect condition. The specimens indicate a bird about as large as the Golden-winged Woodpecker (*Colaptes auratus*, Su.). A new species of *Catarractes*, termed the *Catarractes affinis*, may be based upon a right humerus, which is entire, and in an excellent state of preservation. The *Meleagris altus* is determined on portions of four skeletons, and resembles most nearly, in size

and general features, the common wild turkey of North America. It may readily be distinguished, however, by its more slender proportions, and especially by the more elongated posterior limbs. A much smaller species of the same genus is the *Meleagris celer*, represented by two tibiæ and the proximal half of a tarso-metatarsal bone, which were found together and probably belonged to the same individual. The remains indicate a bird of about one-half the size of the *M. altus*. The *Grus proavus* is an extinct species of crane, somewhat smaller than the *Grus Canadensis*, Temm., and is indicated in the Yale Museum by a nearly perfect sternum, a femur, and a few other less important remains, which probably are parts of the same skeleton. The sternum apparently resembles most nearly that of the Sand-hill Crane, but differs from it in many particulars.—*Scientific American*.

Fossil Insects.—A large number of fossil insects have been discovered in the Tertiary shales of Colorado, associated with fossil fish, leaves, and fruit. In Wyoming territory similar objects have recently been obtained, many of them, however, being quite undistinguishable. About forty species have been made out, belonging to the Diptera, Coleoptera, Hymenoptera, Hemiptera, Orthoptera, Neuroptera, Arachnida, and Myriapoda; the greatest number of specimens belonging to the first-named group, and the next most abundant being the beetles. The shales in which these fossil insects are found have a thickness of a thousand feet.

New Carboniferous Land Shells.—Two new species of land shells have recently been met with in the coal-measures of Illinois. One of these is a pupa, and has been named *Pupa vermilionensis;* the other is a helix, and has been described under the name of *Anomphalus Meekii*. These ancient terrestrial animals are highly interesting as indicating that the atmosphere of the Carboniferous period was capable of being breathed.

Coal Section.—In answer to an inquiry by E. T. Scott, as to what *coal* is likely to produce a good section, I may say that after having made and examined a very considerable number of coal sections, it is my opinion that nearly all *true* coal, if properly prepared, gives evidence of "vegetable structure"; but if Mr. Scott wishes to see cellular tissue in coal, I can only say that it is very rarely to be seen, except in preparations of "mother-of-coal." Cellular tissue is, however, found beautifully preserved in certain nodules, which abound in the coal in some localities, and sections of which are often exhibited and sold as coal sections. The structure of coal varies in detail, but lycopodiaceous spores and sporecases ("vegetable structures") exist in greater or less abundance in a very large proportion of the true coal.—*Edwin T. Newton*.

NOTES AND QUERIES.

Herneshaw (p. 282, 1872).—This word is probably used for "heronçeaux," in modern French *héronneau*, a young heron. A similar word occurs in Chaucer:—

> "I wol not tellen of hir strange sewes,
> Ne of hir swannes, ne hir heronsewes."
> "*Sqvire's Tale*," ll. 10, 381-2.

The swan and heron were coveted dishes at high feasts, and "sewes" here means dishes (cf. the French *assiette*, a plate, the sewer being one who served, or set on dishes at table). In Halliwell's Archaic Dictionary, i. 446, we read: "Hernshaw, a heron; 'Ardeola, an hearnesew,' Elyot, 1559; Hernsue, MS. Linc. Gloss.; Herunsew, Reliq. Antiq., i. 88." It thus appears that "herneshaw" and "heronsew" are convertible terms; but the true heron-*shaw* means a wild, wooded place where herons breed in a state of nature,—a heronry in modern parlance. It has been also contended that Shakspeare meant "heronshaw" in Hamlet, act ii. sc. 2, where he writes "I know a hawk from a *handsaw;*" the terminal "shaw" would here have a third meaning, viz., a dummy, or *sham* heron, a decoy, or stuffed bird set up to train young hawks by; but it is not likely that he would obscure his real meaning by writing "handsaw," if he meant a "heron."—*A. Hall.*

The Herneshaw.—This is the old name for the common heron. Halliwell, in his "Dictionary of Archaic and Provincial Words," spells it "hernshaw." I quote his notes upon it, as they may be interesting to Mr. Hudson: "'*Hernshaw*, a heron;' '*Ardeola*, an *herneshew*,' Elyot, 1559; *Hernsue*, MS. Linc. Gloss.; *Herunsew*, Reliq. Antiq., i. 88." Col. Montagu, in his "Dictionary of British Birds," gives the following provincial names for the *Ardea cinerea*, Latham:—heron, hern, heronshaw, crane, long-necked heron, heronswegh, hegrie, or skiphegrie. We quote the following passage from the same author: "At present, in consequence of the discontinuance of hawking, little attention is paid to the protection of heronries, though, I believe, none of the old statutes concerning them have been repealed. Not to know a hawk from a *heronshaw* (the former name for a heron), was an old adage, which arose when the diversion of heron-hawking was in high fashion; it has since been corrupted into the absurd vulgar proverb 'not to know a hawk from a handsaw.'" *Shaw*, a shadow, is from the Saxon, according to Bailey, "a tuft of trees which encompasses a close shade." Hence then *Buckshaw* (a place in Dorset) may have been a shady place resorted to by the deer, and so *heronshaw* was, perhaps, the tuft of trees inhabited by the heron, and so the bird and its abode got confounded into a single name. In Halliwell's Dictionary, before quoted, we find the word "*Shaw*, a thicket. This word is often explained as a small wood, and in the glossary of Syr Gawayne, a grove or wood."

> "That sange in the sesone in the schene *schawes*,
> So lawe in the lawndez so lykand notes."
> *Morte d'Arthure.*

> "In summer when *shawes* be sheyne,
> And leves be large and long,
> Hit is fulle mery in feyre foreste
> To here the foulys song."—*MS. Cantab.*

The word "heron" is from the French, and on turning to Deblainville's French and English Dictionary I find: "*Héron*, s.m. (a large kind of water-fowl that feeds upon fish), *heron* or *hern;*" and in the English and French part of the same work, "Heronry

or heron-shaw, s. *héronnière*." I seldom go to my water-meadows on the Yeo, in Dorset, without seeing a heron. I fancy we have more than one heronry or heronshaw in the county, though they must be over ten miles from this.—*J. Buckman, Bradford Abbas.*

HERNESHAW.—Spenser himself, in his spirited description, furnishes the key to the mystery; the bird meant is the heron, which is often (I might say always) called by the country people in the Eastern counties a "harnsaw," or "harnsey." Shakspeare makes Hamlet speak of "knowing a hawk from a hernshaw," stupidly corrupted into "handsaw." Chaucer in his "Squire's Tale" has "heronsewes":—

> "I wol not tellen of hir strange sewes (dishes),
> Ne of hir swannes, ne hir *heronsewes*."

In a Latin glossary, *circa* 1559, *Ardeola* (Ardea) is translated a *hearnesew;* in MS. Gloss. Linc. we have *hernsue;* in Reliq. Antiq. it is spelt *herunsew;* in our modern lexicons *hernshaw* is explained as meaning a heronry; in Grieb's German Dictionary *Keiherstand* is translated *hernshaw, heronry;* Dansk Ordbog, *heirekede* is translated herons' nests, *hernshaw.* Tyrwhitt, in his glossary to Chaucer, explains *heronsewes* to mean young herons, no doubt deriving it from the French *héronneau,* a young heron. I am not quite sure that *hernshaw* and *heronsew* were not formerly distinct words; the former being compounded of *hern* (heron), and *shaw* a small wood or coppice, and *heronsew,* a corruption of *héronneau;* the two words were no doubt soon confounded, and *heronsew, hernsew, harnsaw,* and *harnshaw* were applied to the bird itself, as, for instance, the word "eelfare" is a provincialism for a young eel (in some counties corrupted to Elver). The word "eel-fare" was originally applied to the migration of the young eels, from the Anglo-Saxon verb *faren,* to go.—*F. Kitton.*

BORINGS IN FOSSIL WOOD.—Some time ago a friend at Castleton, Derbyshire, gave me a piece of fossil wood. On cutting up this piece I found it to be pierced with small round holes, somewhat less than $\frac{1}{16}$ of an inch in diameter. At first I thought these holes might be part of the structure of the wood; but on grinding the sections down, I found them to be the borings of some small larva or beetle, for I could plainly see, under the microscope, that the walls of the vascular tissue of the wood had been gnawed away. The borings at intervals are filled with the excrements of the insect, all beautifully preserved. The wood is silicated, and shows the markings on the walls of the vessels very well—two and sometimes three rows of pitted ducts.—*John Butterworth.*

INSECT ANATOMY.—Would any of your correspondents inform me of the titles and price of any works on insect anatomy? I have several good works on general entomology, also Lowne's "Anatomy of Blow-fly;" but would like to have some work treating on the anatomy of insects in general. —*J. S. H. Wigan.*

MICROGRAPHIC DICTIONARY (SCIENCE-GOSSIP, p. 276, 1872).—"W. L. N." is mistaken respecting the Dictionary. Parts IX. and X. were published in August and November respectively. It is unlikely that a book with a constantly increasing demand would be abandoned in the middle of the *third* edition.—*E. P. P.*

HAWK AND CANARY.—Thinking the following incident would be interesting to many of the ornithological readers of SCIENCE-GOSSIP, I have extracted it from the columns of the *Hereford Times.* A similar occurrence is mentioned by Montagu, with this exception, that the window was opened, the hawk captured, and paid the penalty for its audacity. "One Sunday morning lately, the writer of this brief notice was present in the house of a gentleman in Hereford. A canary was hanging in a cage in the window next the street, when a hawk from some gardens opposite flew against the window, evidently desirous to make the songster its prey. In this it was foiled; but the fright was fatal to its intended victim, for it fell from its perch, lingered for a day or two, and then died."—*P. B. J., Hereford.*

SUGARING.—I noticed some months back, in the pages of this periodical, inquiries as to the *modus operandi.* Full directions were given by many correspondents. But let not those with whom the season has been the first time of trying it be discouraged at their want of success. Night after night have I made my expeditions, and the result, on nearly every occasion, the same—"a beggarly account of empty boxes." There can be but little doubt that this was owing to the unseasonably cold weather which prevailed. From observations made by Mr. Glaisher, at the Royal Observatory, the temperature was some degrees lower than it has been in the corresponding month (September) for the last fifty years. And I entirely concur with "J. R. S. C." and Mr. Reeks, that "mild, wet winters prove far more destructive to insect life than dry ones with any amount of severe frosts."—*Joseph Anderson, Junr.*

AN OPTICAL QUERY.—Will some one of your readers, skilled in optics, give me the *rationale* of the following effect? Holding between the candle and the eye, at a distance of almost six or seven inches from the latter, a glass slide with an opaque microscopic object about $\frac{1}{4}$ of an inch in diameter in the centre, I notice an opaque object which obscures the light of the candle; but as the glass is approached more nearly to the eye, the opaque object vanishes, and the entire flame of the candle is seen, as if no opaque object intervened.—*R. H. Nisbett Browne.*

INTERFERENCE OF LIGHT.—On Saturday, the 15th of June, 1872, I was reading at the hour of 3.55 A.M., in a room having an eastern aspect. The room was lighted by a common benzoline spirit lamp set on the table, which was, however, burning rather dimly, having been alight all night. I held the book I was reading so as to throw the combined light of the dawn entering by the window and the benzoline lamp on it. On coming to the bottom of a page, I was much surprised to notice that the shadow cast by my hand on the white margin of the page was of a bright blue colour. Thinking this might be the result of some derangement of my eyesight, I tried the experiment with papers of various colours, but found the result the same. The shadow cast by the lamp was black at and within six inches of the flame; then faintly blue or indigo for three or four inches; at twelve inches it was deeply, darkly, beautifully blue; at two or three feet it was fainter; and at six feet was only seen as a blue umbra or fringe round the black shadow. The distance of the lamp from the window was seven feet. I noted these particulars at once,

and having failed to find a satisfactory explanation in the ordinary text-books, have applied to you.—*Horace Wilson.*

Keeping Pupæ through the Winter (p. 237, 1872).—In reply to "M. H.," I may state that I have been accustomed to keep those caterpillars which I either know or suspect will require earth in which to undergo their transformations, in earthenware jars or pots, having from two to six inches' depth, according to the size and habits of the species. Of course, it is only necessary to place the caterpillars in these when they appear to be almost full-grown. The earth I use is common garden mould, mingled with a little sand, to keep it from binding too closely. Some persons recommend the mould obtainable from decayed trees. If this is used, it must be well baked, to destroy small insects, mites, &c. I do not moisten or disturb them during the winter. In the spring, I disinter them and place them on dry moss. I should add, that after a caterpillar has gone down to prepare for pupation, the receptacle should not be moved until it has settled down, for a jerk given to the pot or jar will alarm the caterpillar frequently, and bring it to the surface of the earth, to undergo its change under disadvantage.—*J. R. S. C.*

The Privet Hawk.—I had in my garden, last autumn, caterpillars of the Privet Hawk-moth feeding on the Privet, the Lilac, and the Laurestine. The Privet and the Lilac, given by Stainton as the food-plants of this beautiful caterpillar, are very closely allied, both belonging to the *Oleaceæ;* but the Laurestine (*Viburnum Tinus*) belongs to an order sufficiently remote, that, namely, of the Elder, the Linnæa, and the Honeysuckle,—the *Caprifoliaceæ.* Individuals shifted from one of the plants to another at once fell to work as if they perceived no change of diet. I saw *Viburnum Tinus* serving as food-plant to the same caterpillar in Clarendon Road.—*J. J. M., St. Helier's, Jersey.*

Bees in Birds' Nests.—In answer to T. C. Oborn's interrogatory paragraph in "ours" for October, headed "Chaffinch's Nests," I have to say the following:—Only once has a case similar to that which T. C. Oborn speaks of attracted my attention. It was last July, that, walking in a friend's garden, we discovered what proved to be a robin's nest almost entirely hidden from observation in the ivy and climbing rose that overarched the gravelled walk. My friend carefully put his hand into the nest to feel for the supposed eggs, but as quickly drew it out again, exclaiming that he had been bitten or stung. On pulling out the nest with a stick, there flew out an indignant bumble-bee,—not one of the great big fellows whose stings are so innocent according to those who have had no stinging experience, but a smaller, foxy-haired little fellow. It left behind in the nest a large dark-coloured waxen cell containing embryo bees in the shape of little white grubs. The nest was, like T. C. Oborn's, about five feet off the ground. It had been built that season, and contained no eggs when the insect appropriated it, the fledged birds having flown some time before. Although such a habitat for bees is new to the experience of some practical bird-nesters of my acquaintance, I think it may prove a not uncommon one.—*W. W. H.*

The Woodpigeon's Cry.—"The amusing incident with regard to the Woodpigeon's cry" mentioned by Mr. G. O. Howell in your July number, has long been familiar to me in a slightly altered form, in common, no doubt, with others who are acquainted with the north of Ireland. In our version of the story, the thief is, as you may anticipate, an Irishman, and the words supposed to be uttered by the pigeon were "Tak two coos, Jemmy" instead of "Take two sheep, Taffy," as Mr. Howell's version has it, the object of theft being a cow instead of sheep. The words seem to be Scotch, or partly so. The inhabitants of the North of Ireland are principally Scotch, and their language is full of Scotch words and expressions. Notwithstanding this, the story may be really Scotch in its origin; I have never heard it, however, in Scotland, though I have lived there for some time. I may add that the Woodpigeon generally commences, not with the note representing the word "tak," which is a short and sharp sound, but with that representing the word "two," which is a long and rather mournful note; the next note, representing "coos," is also long, longer indeed than the preceding one; the word "Jemmy" is represented by two short sharp sounds. We have thus two long notes, followed by three short ones, thus—"Twō cōōs Jĕmmy̆ tăk" (— —— ◡ ◡ ◡), the longest note being the second. Sometimes, however, the bird commences with the short sound "tak," as the story represents it to have done.—*T. A. H.*

The Skulpin.—Couch, in his admirable "History of British Fishes," vol. ii. p. 174, when referring to the Skulpin, says: "Pliny further tells us that to the Romans, in addition to the name of *Callionymus,* it was known as the *Uranoscopus,* or sky-gazer, because its eyes were on the top of the head, with their vision directed upwards. This latter circumstance in connection with its former name, which recognizes the beauty of its appearance, may be supposed to point to the Yellow Skulpin, which answers to both these particulars; but if any doubt remains concerning it, we are not able to mention any other author of a remote date who has given an account by which it can be more definitely determined." I suppose this statement respecting the upward aspect of the eyes has arisen from the fact that ichthyologists a few years ago described fishes as they appeared when dead. There is at present a specimen of the Skulpin in one of the marine aquaria in the Central Exchange Art Gallery, Newcastle-on-Tyne, and, although the eyes are certainly placed near the top of the head and are tolerably close together, they do not look upwards, but sidewise, and the upper surface of the eye is protected by a thick, elevated, light yellow integument. There is every reason to believe that the general distribution of marine aquaria, and especially the devotion to the interests of science of such receptacles for marine animals, will be the means of largely increasing our knowledge of the habits and forms of marine animals, and at the same time remove many erroneous impressions that now obtain respecting their habits and modes of life.—*T. P. Barkas, F.G.S.*

Cockchafers.—Some time ago I met with a curious account of the ravages committed by these insects, in an old book, called "Wood's Zoography," published at the beginning of the present century. It is extracted from "Philosophical Transactions" for the year 1697. The place where the cockchafers first appeared was the south-west coast of Galway, and they penetrated several miles inland. During the daytime numberless swarms hanging to every tree and hedge in the district were busily engaged in their destructive work; but towards evening, when the sun went down, they would all disperse

and fly about with a strong humming noise, so as to darken the air for several square miles. The noise made by this swarm in gnawing the leaves resembled the sawing of timber, and in a short time after their arrival they had eaten up every green thing. Several causes contributed to their destruction. High winds and steady rain killed many millions, and the pigs devoured them with great relish as they fell from the trees. The poor people also lived upon them when they had nothing else left to eat. Towards the end of the summer all the chafers that remained took themselves off in a body as they had come, and never returned in succeeding years in such swarms. In this country such visitations as these are very uncommon, but on the continent they are of frequent occurrence.—*E. C. Lefroy, Blackheath.*

Tenacity of Life in a Hermit Crab.—We have a small sea-water aquarium, the principal occupants of which are a number of sea-anemones of different colours and sizes, and a hermit crab, which last is a great favourite, and causes us much amusement by his ceaseless activity and odd ways. The other day we missed the little fellow, but thinking that he might have hidden himself under some pieces of rock, and that he would soon reappear, we did not concern ourselves much about him. Three days passed and still he was nowhere to be seen. We then emptied the aquarium of its contents, and looked most carefully among the pieces of rock and coral, but alas, the missing gentleman was not to be found. At last it was suggested that a sea-anemone must have made a meal of him, in which case we knew that the shell would soon be rejected. We therefore examined the anemones one by one, and soon saw a little bit of the shell of our hermit protruding from between the tentacula of one of them. With some difficulty the crab was extricated from the living grave which was only just large enough to hold him, and to our great astonishment he at once began to run about in his usual lively manner, and though his shell is somewhat broken, he seems to have sustained no bodily injury, and is in as good health and spirits as ever. Of course his name from henceforth will be "*Jonah*"!—*E. P. Jackson.*

The Camberwell Beauty.—I believe that the correct date for the Camberwell Beauty, alluded to in Mr. Barrett's paper as having been observed at Easton, was March 22nd, 1847, and that I was in error in informing him it was on July 31st. Cf. *Zoologist*, p. 1702.—*J. H. G., Jun.*

How does the Spider weave its Web?—If your correspondent "G. C." will refer to vol. ii. of Kirby and Spence's "Introduction to Entomology" (third edition, 1823), he will find much information as to the wonderful means of (so-called) "flying" practised by spiders, indicating that they can thus with great facility bridge over with their webs a considerable span.—*S. F.*

How does the Spider weave its Web?—Of the methods suggested to explain the difficulty presented by "G. C.," the most probable appears to be that the spider possesses the power of projecting its thread to some distance, and fixing it to any object it may aim at. For corroboration of this I will refer "G. C." to page 213 of last September number of Science-Gossip. The web then may be formed in this way:—The spider first forms a ring for the boundary of its web, as much in the shape of a circle as circumstances allow. In the case of a stream, this ring is attached to grass, &c., at each side. It then forms a thread across from side to side. From the middle of this diameter it makes the radii, and then fills up the centre with the concentric circles.—*G. R.*

Unio littoralis.—The shells from the Rhine mentioned by me in November's Science-Gossip turn out to be those of *Unio Batavus*, and not *littoralis*, which, I am told, is not found so far north as Holland; it occurs, however, in France.—*Harry Leslie.*

Ants.—Can any of your readers tell me the best means to extirpate the Red Carrier-ant (*Œcodoma cephalotes*), which is so very destructive to the leaves of shrubs and trees throughout Brazil? They are particularly fond of rose-trees, and when once they make their appearance the tree is doomed, as every fresh leaf is cut off and carried away into their holes. Much labour is spent in trying to destroy them by forcing charcoal or other fumes into their holes, but with little effect. It is doubted whether they are affected by any fumes or gases whatever; and they will not eat any kind of seeds, grain, sugar, &c.; so that they cannot be destroyed with arsenic or phosphorus. If anything could be found to be really effective against them, it would command an extensive sale throughout Brazil, and take the place and name of the—*Ant-eater.*

Cole Tit (*Parus ater*).—Having set a common brick trap in the garden, I was surprised to find on two occasions, when the trap was sprung, that the intruder had burrowed out under the brick, the footmarks not being that of mouse, mole, or rat. To make sure of the captive, I banked up earth all round the outside of the trap, and laid down inside a slate, when, behold, was secured a cole tit, and what is remarkable, it had exhausted itself to death with efforts to burrow out; the crown of the head was sore and bare of feathers, from contact with the edge of the brick; its claws of each foot were worn down to the quick, and the beak had all the appearance of desperate efforts to bore a hole through the slate; the tail feathers were clotted with earth, and the edges of the wings mutilated. Can any of your readers inform me if the Cole Tit burrows for food, such as larvæ, underground? A friend told me in Herefordshire this bird is called locally the "Burrow-down Tit."—*F. D. S.*

Ipswich Science-Gossip Society.—This flourishing society, which took its name from our magazine, has just held its third conversazione, at which nearly seven hundred persons were present. The hall in which it was held was filled with objects of interest. Among others was shown a musical-flame organ, constructed by Mr. Ford Goddard, on the principle of Tyndall's musical flames. This is, we believe, the first time the original discovery has been practically applied, and too much praise cannot be bestowed upon it. Several simple airs were played by it. Electro-magnetic engines, in motion, constructed and exhibited by the Hon. Mr. Grimston, Dr. Piesse's "Odophone," the "Siren," an instrument for measuring the velocity of music-sounds, and various other objects of the same kind, were exhibited. Splendid cases of butterflies, comprising local varieties, were shown by Mr. Henry Miller, hon. sec., and Mr. Long. Other natural objects were minerals and fossils, birds' eggs, &c. The committee had worked for weeks previous, and, together with the president, Dr. Drummond, and the hon. sec., Mr. Miller, deserved their success.

The importance of these gatherings in creating a wider sympathy for science cannot be over-estimated.

Longfellow's Compass-plant.—This plant is the *Silphium laciniatum*, well known to the settlers and hunters of the Far-West, belonging to the class *Compositæ*, and all the species being natives of the United States. But it is a coarse and stout, not delicate and fragile plant, as described by Longfellow, though it is correct that the edges of its vertical leaves are directed north and south. The cause assigned for this by Dr. Gray is no doubt the correct one,—that both sides of the leaf are equally sensitive to light, and the stomata, or pores, about the same in number on each surface.—*E. Edwards.*

Collecting and Setting Lepidoptera.—As a collector of twenty years' experience, I beg to offer my opinion upon the above subject. In reply to your correspondent "F. E. A.," as regards flat-setting, my experience has taught me that those specimens set in that style are valueless, because all practical British lepidopterists set their specimens upon rounded corks; and to place specimens in the cabinet set in any other style would not look uniform. I think every entomologist will agree with me that all specimens should be thoroughly dry before they are removed from the setting-boards. I don't see how it is possible for the wings of every specimen to drop exactly the same distance if removed before they are dry, as suggested by your correspondent "F. E. A." By using braces pointed, and only one pin, we may save space. By setting in this style, about twenty specimens of the Yellow Underwing (*Noctua pronuba*) size may be set upon a board 14 inches long. Setting with a pin at each end of the brace, not more than ten specimens could be set in the same space. Another mistake is made by the same correspondent, namely, mixing the captures with the empty boxes. Why cannot an entomologist have two pockets, and keep them separately? If not, the chances are that, while you are hunting for an empty box, your prize will either make its escape, or spoil its beauty by running about the net, especially if your net is at all damp. I always use a bottle charged with cyanide of potassium, as recommended by Dr. Knaggs. The moment my prize is in the net, I transfer it to the bottle. When it is stupefied, I turn it into my hand and pin it, after which I place it in a zinc collecting-box, with two or three drops of chloroform, to prevent its returning to life. Such large and active insects as *Sphinx convolvuli* should be chloroformed in the net. Butterflies may be pinched, but it is not a good plan. I much prefer using the bottle. Only such insects as fly in the daytime, and small species, should be boxed, and then great care should be taken to keep them cool. I usually carry a zinc box for this purpose, and pack the boxes with a few green leaves. I advise all amateur lepidopterists to read "the Lepidopterist's Guide," by H. Guard Knaggs, M.D., F.L.S., which I believe to be the best work upon practical entomology.—*E. G. Meek.*

Flat *v.* Rounded Setting-boards for Lepidoptera.—In Science-Gossip for December last, your correspondent H. A. Auld cautions entomologists against using flat setting-boards, which "F. E. A." recommended in your November number. As an authority to back up his opinion, he mentions the name of Dr. Knaggs, who is well known to be one of our best entomologists. Now, although H. A. Auld denounces setting on flat boards, yet he does not give a reason for its disuse, but contents himself with asking the question, "Why the lepidoptera in our public museums are not set in this way, and also why our great authorities do not set theirs on flat boards?" Now, if H. A. Auld wishes to know the reason, it is this: All continental lepidoptera are set on flat boards, and English entomologists being jealous of the nationality of their specimens, set them on rounded or bevelled setting-boards, in order that they may not be confounded with foreign specimens. Besides, flat-setting is considerably easier to beginners, and in addition, lepidoptera so set have a more natural appearance. I cannot, however, agree with "F. E. A." in recommending the use of setting-boards made entirely of wood, my own experience being that the softest of wood would be found too hard for the points of the strongest of entomological pins. Dr. H. G. Knaggs, in his "Lepidopterist's Guide," p. 116, says: "Flat-setting has many great advantages over the ordinary method (setting on rounded boards), but it is very unpopular in this country, for the reason that continental specimens are set in this way, and English collectors are very sensitive on the point of having the authenticity of their captures doubted."—*Claude Ryan.*

Dried Plants.—Having tried many methods of drying and pressing a specimen of *Atropa Belladonna* (Deadly Nightshade), with a view of retaining, in some degree, its natural green colour, but, alas! always without success, I should be glad, therefore, to know, through any of your numerous readers, whether such a thing as preventing this discoloration be accomplishable or not; and providing it should not be, if they can state as to what the probable cause of failure is due? Also whether a similar tendency to discoloration in other plants, when pressed and dried, be at all attributable to any property common to that plant? Else, so far as regards *Atropa Belladonna*, as also *Melampyrum pratense* (common yellow Cow-wheat), I have thought in my own mind that perhaps the general habit of these plants, growing, as they mostly do, in shady situations, might have something to do with it, in that of preventing the free development of chlorophyl (green colouring-matter of plants) in its tissues. Still, since this theory seems to be opposed by other plants to which this remark does not apply, I am compelled, therefore, to distrust the idea, as affording any explanation thereof, altogether.—*John Harrison, Newcastle-on-Tyne.*

Beech-trees and Lightning (p. 283, last vol.).—I venture to suggest that the exemption of beech-trees from injury by lightning is due to the uninterrupted passage afforded by the smooth bark to the electric fluid, while the rugged surface of oaks offers numerous points of resistance, and thereby causes injury to the tree.—*R. Egerton.*

Communications Received up to 12th ult. C. L. A.—J. W. N.—J. P. B.—S. G.—T. H. G.—F. M. C.—F. D. S.—H. L.—J. L.—S. F.—A. G.—E. L.—J. E. S.—J. P. B.—H. E. W.—J. B.—C. C.—G. B.—T. B. B.—F. H.—J. F.—A. H.—A. C.—W. S. P.—R. H. P.—E P. P.—J. S. H.—J. F.—J. B.—F. W. M.—W. L. S.—J. H. E.—C. L. J.—T. E. T. W.—E. T. S.—T. B. W.—J. R. S. C.—E. W.—F. A.—J. P.—A. L.—F. S.—A. N.—E. W.—J. M.—J. B—E. B. K. W.—W. K. C.—G. G.—J. G. R. P.—P. B.—J. H. M.—W. T. P. W.—R. G.—E. L.—H. R. W.—J. D. M—G. C.—J. F.—A. S.—H. E. D—J. B.—J. A. Jun.—E. T. N.—R. H. N. B.—W. G. W.—S. W.—T. E. D.—E. E.—J. H—J. W. G.—J. W. G.—W. S. P.—C. R.—E. J. M.—W. M. R.—Dr. L. G. M.—C. M.—J. G.—C. H. M.—J. H. H.—C. M.—R. H.—E. C. J.—E. C. M.—A. A.—J. S. Jun., &c.

NOTICES TO CORRESPONDENTS.

J. Sargent, Jun.—The insects are a species of *Coccus*, females. The eggs are hatched under the body of the mother, which serves as a cocoon. The "Cochineal insect" is a well-known member of this class.

Rev. S. A. B.—The pinnule certainly reached us as described. "White Varieties" became a drug in the market. Hence our closing our columns to their further discussion. As to the rest, accept our apologies. We will inquire into the matter.

T. R. should refer to the vol. for 1872; at page 231 he will find all the information he requires respecting dyed sections of wood.

A. P. S.—See vol. for 1872, page 118, for an answer to your query respecting Paste Eels.

C. H. M.—They are the specific names of well-known butterflies. See Newman's "British Butterflies." An entomologist would have been in no difficulty about them.

A. O. W., and "Bryum."—Answers next month.

E. C. J.—An unavoidable delay has arisen in the naming of the zoophytes. Both these and the fungi will appear in our next. Latter arrived too late for insertion in present issue.

A. Smyth.—The *Bombyx Cynthia* is the same species as that you name. The other species is believed to be the Japanese silk-worm, now much cultivated. Your third query is rather vague. Newman's "Butterflies" and "Moths" would do for the Lepidoptera; Rye's "British Beetles" for Coleoptera; and Stephen's and Hubner's great works are the only other general ones.

R. H. Philip.—We cannot undertake to name small seeds.

J. C. H.—Our correspondents should remember that our rule of priority in the insertion of "Exchanges," &c., cannot be departed from. As we every month receive more than we can insert, it follows that some must stand over. These are always the last received.

J. F.—We cannot open our columns to complaints of Publisher's delays. The best plan would be for J. F. to write to the publishers about this grievance. We thoroughly sympathize with it.

C. L. Archer.—See paragraph in Microscopical column of Science-Gossip for December on "Mounting in Dammar."

F. H.—Your communication will receive our attention.

A. E. Murray.—The small fungi on the piece of wood were *Agaricus epiphyllus*; the other was a portion of *Polyporus*.

G. Grant.—Your specimen was a piece of *coke* that had got among your coal!

J. B.—Many thanks for the slides. The sections are admirably cut.

"Hernshaw" and "Micrographic Dictionary."—We have received so many communications from kind readers on these subjects that we do not think it necessary to devote a number to them!

W. N. wishes to know of any Field Club or General Natural History Society in the North-east of London. Perhaps some of our correspondents can answer him.

E. H.—We do not think you could do better than advertise your collection in our columns, stating what they are. Send such an advertisement to the publisher, 192, Piccadilly, for price, &c.

Edwin Clarke.—Your specimen is the male plant of the common Hemp.

F. M. C.—A re-issue of the "Micrographic Dictionary" is slowly going on. You can begin to take the monthly numbers whenever you think fit, price 2s. 6d. each. The publisher is Van Voorst.

EXCHANGES.

Slides of Pieces of Wing of Demerara Butterfly (*Morphio Menelaus*) mounted, for other mounted objects.—C. L. Watchurst, 33, Blessington Road, Lee, London, S.E.

For Seeds of *Amaranthus hypochondriacus* send stamped directed envelope to P. Smith, Leigh Street, Warrington.

British Birds' Eggs for British Lepidoptera.—Send for Lists to W. Dick, Burgh School, Dunbar, N.B.

Wanted, *good* Specimens of Lanestris, Neustria, Apicaria, Cytherea, Trilinea, Corticea, Cursoria, Conigera, Comma, Lithargyria, and Tragopogonis. Good Lepidoptera in exchange.—Joseph Anderson, Jun., Alresford, Hants.

For Oak Leaf with "Spangles" and "Button Galls" (illustrated in Science-Gossip, vol. ii. page 228), send stamped and directed envelope to J. H. G, 21, Church Street, Ashby-de la-Zouch.

Case of *Melicerta ringens*, mounted, for other good mounted objects.—John C. Hutchison, 8, Lansdowne Crescent, Glasgow.

Eggs of Common Tern from Sea-lion Island, Port Santa Cruz, Patagonia, in exchange for other eggs.—John M. Campbell, 6, Carrick Street, Glasgow.

Leaves of *Deutzia scabra* and *Aralia papyrifera* (Rice-paper plant) showing stellate hairs, in exchange for any mounted object.—J. R. Simmonds, 32, Cornwall Street, Moore Park Road, Fulham, S.W.

Seeds of Australian flowering trees and shrubs to exchange for seeds or seedlings of hardy sub-tropical plants, or seeds of British heath, forest, or water plants. Lists on application.—Rev. A. L. Ackland, Grammar School, Colchester.

For vertical and transverse Sections of Hoof of Ass for Polariscope, send stamped envelope and any microscopic objects to Jas. Lumsden, 197, Dorning Street, Wigan.

Butterflies from Amazons and Borneo; Seeds from Madagascar and E. Peru; Shells from Cuba, N. Caledonia, &c.; for microscopic slides.—G., 20, Maryland Road, Harrow Road, W.

Sibthorpia europœa; Sedums, six kinds; Saxifragas, twelve kinds; Aubretias, six kinds; Campanulas, three kinds; Dianthus, four kinds; and many others.—For list apply to C. Malyon, Lewisham Road, S.E.

Crystals for Polariscope.—A variety, well mounted, to exchange.—Send list of duplicate slides or material to A. Allen, Felstead, Essex.

Wanted, Slides of selected named Diatoms, recent and fossil. A liberal exchange in vegetable and entomological slides.—Send lists to E. Ward, 9, Howard Street, Coventry.

Various preparations from Coleoptera (named) offered for other well-mounted slides.—Send lists to W. G. W., 14, Smithford Street, Coventry.

For Diatomaceous deposit, containing thirty-six species of diatoms, send stamped addressed envelope and object to John H. Martin, 86, Week Street, Maidstone.

A few finely-figured Santonine slides (Polar) offered for other good slides.—N., Fareham.

For Hair of Long-eared Bat send stamped and directed envelope, with object of interest (mounted ones preferred) to F. S., Post Office, Rugeley, Staffordshire.

Lower Tertiary Fossils for mounted microscopic objects.—C. C., 6, Landport Terrace, Southsea.

Small Shells, stuck on sea-weed, in exchange for other microscopic objects.—J. N. Hoare, the Hill, Hampstead.

Several slides of Wing of *Polyommatus Paris* (a beautiful opaque object), in exchange for any other good entomological slides.—Address, J. S. Harrison, Mr. Wise's, 38, Frog Lane, Wigan.

For mixed Seeds, comprising several beautiful as microscopic objects, send stamped envelope and object of interest to R. H. Philip, Anlaby Road, Hull.

Foraminifera from Borneo, and Wing of Demerara Butterfly mounted, for other mounted objects. Lists exchanged.—C. L. Watchurst, 33, Blessington Road, Lee, London, S.E.

Chalina oculata (a spiculous sponge), for named unmounted sections of canes and pepper-tree.—H. B. Thomas, 13, Market-place, Boston, Lincolnshire.

Seeds of British Wild Plants.—Send a list to W. W. Reeves, King's College, London.

Three good Slides for a well-mounted section of human tooth or human bone.—E. Lovell, Holly Mount, Croydon.

P. Alexis, male and female, upper and under; *V. Atalanta*, upper and under; Pupa and Imago of *Plusia gamma*; Dragon-flies, *Agrion* (?), for Fritillaries or Hairstreaks.

British Lepidoptera in exchange for Birds' Eggs and Land and Fresh-water Shells; a few live Specimens of *Helix arbustorum* for exchange.—W. R. Mann, 17, Wellington Terrace, Clifton, Bristol.

BOOKS RECEIVED.

"The Micrographic Dictionary." Parts 8, 9, 10. Van Voorst, 1, Paternoster-row, London.

"The American Naturalist," November.

"The Canadian Entomologist." No. 10.

"The Journal of Applied Science."

"Land and Water."

"Les Mondes."

"The Animal World."

"Elementary Geology." By J. Clifton Ward. London: Trübner & Co.

"The Expression of the Emotions in Man and Animals." By Charles Darwin, F.R.S., &c. London: John Murray.

"Fourteenth Report of the East Kent Natural History Society."

"Monthly Microscopical Journal."

"Certain Wingless Insects." A Paper read before the Brighton and Sussex Natural History Society. By T. W. Wonfor, Hon. Sec.

"The Earth a great Magnet." By A. Marshall Mayer, Ph.D. London: Trübner & Co.

"Fifth Annual Report of Eastbourne Natural History Society."

COLLECTING AND PRESERVING.

No. XII.—GRASSES, &c.

By James Buckman, F.L.S.

GRASSES form such a distinct group of plants, and their study is so often undertaken for special purposes, that a few remarks upon their collection and preservation can hardly be considered as out of place in Science-Gossip.

Delicately as grasses are formed, yet it cannot be said that their tissues are so liable to injury, or their colours so evanescent, as are those of the flowering plants which the botanist ordinarily delights in. Nor indeed are the Grasses so succulent as many other herbs. In this respect they may be said to hold a place between ferns and those plants which usually are called flowers.

Again, in the dried state their organs are generally so well preserved as to present all that a botanist can wish for, for identification as well as arrangement; and the student of Grasses ever finds his collection to contain beauties not only in point of rarity, but as regards delicacy of structure and grace of outline.

Viewing them in this light alone, we have often been astonished that so many students of plants pay so little attention to them, and this feeling is enhanced when the great value of the Grasses is considered.

If then a few simple directions for preserving these plants shall have the effect of winning a convert to these views, we shall be delighted; and to this end we shall make our descriptions as simple as our process has ever been easy and simple, and yet complete.

In collecting grasses, as in other tribes of plants, it will be necessary that our specimens should be chosen with the view to exhibit every feature of interest. With this view, then, it will be best in the general way to obtain as much of the plant as possible, so that it may be necessary to get them up by the roots. Still, in many species the root is not of much importance; but there are a few which possess *rhizomata*, or underground stems; such as the *Triticum repens*, *Poa pratensis*, *P. compressa*, *Holcus mollis*, *Agrostis stolonifera*, and others. These should always exhibit these parts; and as such examples are usually agrarian, it is easier to mark down desirable specimens and seek a fork at the neighbouring farm-buildings wherewith to completely get them out, than to carry any substitute in a smaller and less perfect implement.

Having made these remarks, we will suppose that we are now about to sally forth in search of Grasses; in which case we make the following preparations.

As we do not file our copy of the *Times*, we make use of it as collecting-paper as follows:—Each side of the paper is cut in two, or, as a Cockney would say, "in half." Each half is then folded into a double collecting-sheet, and as many of these are taken as are likely to be useful. In each of these papers is put a small slip of writing-paper, on which to note the locality and any other noteworthy fact connected with a specimen when put in the paper. These papers, separately folded, are placed with the open ends inwards in a convenient portfolio, and the collector is ready to take the field.

Of course there will be those who will advocate Bentall's drying-paper, blotting-paper, and so on, and we would not have it supposed that we despise these luxuries; but as we have found the plan advocated always to answer the purpose for Grasses, we have

felt independent of the more refined collecting-papers.

Now let us suppose that we have gathered fifty specimens, and have returned home. The next thing will be to put them as soon as may be in a position for drying.

Our drying apparatus then consists of half a dozen smoothly-planed deal boards, and for our first collection we take two of these, and upon one we lay some few folds of our old *Times*, then a specimen in their papers (having previously improved their arrangement, when necessary), and then some more folds of paper, and proceed as before, until all the specimens have been placed; then put a board on the top sheet, and upon that a stone or a 7 or 14-lb. weight, according to the size and quantity of the specimens. If another day's collection of specimens be made before the foregoing are dry, they may be arranged in the same way on the top board, and another board used and the weight replaced. The object of this is to keep partially dried from fresh specimens, the putting together of which is a fertile source of mildew and decay.

In arranging our specimens for the Herbarium, we procure sheets of cartridge-paper 18 in. long by 11 in. wide, using a folded sheet for each species.

In these papers the specimens are fastened down in the following manner:—

Gum over a portion of the cartridge-paper (so as to have the same colour) with two consecutive coats of a clean solution of gum-arabic.

This can be cut into slips of any length and breadth, making them as narrow as possible for the sake of neatness, and when the specimen is placed in its paper, a few of these slips may be made to confine it in the desired position. Each example is then to be labelled at the bottom of the sheet, and each label should set forth:—*a*, Its botanical name; *b*, its trivial or local name; *c*, the locality whence it was obtained; *d*, the date when gathered: added to which, if presented, the donor's name.

The sheets so prepared may be arranged in groups or genera, each being folded in convenient paper or cloth wrappers, and the whole arranged in volumes of stiff covered portfolio.

This, then, is all that seems to us necessary in the collection and preservation of Grasses; but we would recommend the student, if an artist, to make a typical specimen of each sit for its portrait. In this way we have made drawings of all the species and varieties that have come in our way.

Our drawings are life-size, usually lined in with Indian ink with a fine "lithographic pen." These we partially colour on the spot.

The anatomical details are much enlarged and always fully coloured. To this end our *impedimenta* for a day among the Grasses consist of, besides, the collecting-portfolio, a sketching-block, large octavo size, and a small box of soft colours. Armed with these we have made many a drawing of a grass under the shade of a tree, or in the parlour of some contiguous inn.

Lastly, we would venture to remark, if, besides the interest which Grasses should have for the student of botany, these plants be viewed, as they have ever been by us, as indicators of the nature of soil and the value and capabilities of the land on which they grow, the collector should not fail to make notes connected with the soil, situation, and other practical facts connected with the habitats of GRASSES.

NEW BOOKS.*

HERE we have a batch of new books, the cutting of whose leaves is a veritable luxury. After having enjoyed them ourselves, we cannot do better than make them known to our readers.

Any work from the pen of Charles Darwin requires no recommendation whatever of ours. Whether we believe in his doctrine of Natural Selection or not, we cannot do otherwise than admit the vast influence his writings have exercised on philosophical Natural History. He seems to us to have done for this department of human knowledge what Newton did for astronomy. A new impetus has been given to every department of natural science since the appearance of his "Origin of Species." As a philosophical expounder of difficult phenomena we know not where to look for his equal. How careful an observer he is, and how diligent a collector of facts, his works on the Cirripedia, on the Fructification of Flowering Plants, especially orchids, and that on Animals and Plants under Domestication, all prove. If his "Descent of Man" seemed to some a departure from his habit of strictly adhering to facts, and appeared hazily hypothetical, we feel sure that this on the "Emotions" will more than atone for it. Every muscle in the human face has its meaning here plainly traced. The physiological expressions of men and animals are compared or contrasted, and it is not too much to say that physiognomy—before only known in the works of Bell and the empirical theory of Lavater—has obtained by the present work a scientific basis. Those of our readers who know the charm of Darwin's former works, how he leads his readers on to his conclusions in the clearest and

* "The Expression of the Emotions in Man and Animals." By Charles Darwin, F.R.S. London: John Murray.

"Manual of Palæontology." By Professor Nicholson. London: W. Blackwood & Son.

"Art Studies from Nature, as applied to Design." London: Virtue & Co.

"Physical Geology and Geography of Great Britain." By Professor Ramsay. Third Edition. London: Ed. Stanford.

"Elementary Geology." By J. Clifton Ward. London: Trübner & Co.

most attractive of English, will experience more than their usual treat when they sit down to this book. Never was more truly realized the saying about men labouring and others entering into the fruit of their labours! The illustrations are excellent, and recourse has been had to photographs in rendering the more telling of physiognomical expressions. Even the most antagonistic of anti-Darwinians will not hesitate to admit how much he has learned from a careful study of the work before us.

The appearance of Professor Nicholson's "Manual of Palæontology" will be welcomed by many a student to whom the older work of Professor Owen, owing to its more technical nature, has been more or less of a sealed book. The illustrations are numerous and good, and thus the first want of the student is met. The subject is treated in what we have long held to be the only right one—by considering extinct forms and groups side by side with those now existing. Zoology and Palæontology are thus made to reflect light on each other. Professor Nicholson is thoroughly master of his subject, and his style, as we have before had occasion to remark, is very clear and attractive, although terse. Commencing with the lowest forms of life, we are led on to the highest, living species being alluded to and figured whenever necessary. The great stream of life is thus followed up from its source. A part is devoted to "Palæo-botany," which, we think, it would have been better to have omitted for some time to come. In no department of geology is there so much confusion and doubt as in fossil plants. Nearly all the work already done requires to be done over again. Hence the student can place little confidence on any geological botanical conclusions. There are some good workers in the field—Carruthers, Dyer, Williamson, Dawson, and others—and the chaos will ere long be reduced to order. The fourth part of the work is on "Historical Palæontology," and is very valuable. We are glad to notice a full glossary of terms at the end. From what we have briefly said, therefore, our readers will see that in this "Manual of Palæontology" the geological student has a most valuable and exhaustive work placed at his disposal.

In "Art-Studies from Nature" we have a capital idea, and one that would have well borne more detailed working out than in the present volume, which, by the bye, is admirably got up, the illustrations being of a very high order. It comprehends four papers, all intended for the use of architects, designers, and manufacturers, which originally appeared in the *Art Journal*. The first is by Mr. F. E. Hulme, F.L.S., on the Adaptability of our Native Plants to the Purposes of Ornamental Art, and is, in our opinion, the best in the book. Such familiar plants as the wood anemone, arum, blackberry, cinquefoil, dog-rose, hazel-nut, and hop are so grouped as to surprise the beholder with their really graceful and elegant proportions, and to cause him to wonder that these natural products have not been preferred to the usual architectural conventionalities. Mr. S. J. Mackie has contributed an interesting and original paper on Sea-weeds as objects of design, with microscopic enlargements of structures. The paper on the Crystals of Snow as applied to the Purposes of Design, by Mr. James Glaisher, F.R.S., is most exhaustively illustrated, almost every form of snow-crystal being figured. How beautiful these are, only those who have carefully and repeatedly studied them can understand. The fourth paper is by Mr. Robert Hunt, F.R.S., on the Symmetrical and Ornamental Forms of Organic Remains, and deals with the prettier fossils, animal and vegetable; among which, *Ammonites*, *Trigoniæ*, *Pectens*, and fossil ferns occupy the most attention. We welcome this handsome book as a step in the right direction, and one tending, even from a utilitarian point of view, to give to natural science more importance than it has hitherto obtained. We are sorry, however, to find that the most suggestive of all natural objects, for purposes of artificial ornamentation, has not been dealt with. We allude to the Diatomaceæ, than which nothing can furnish more striking designs of exquisite beauty to the jeweller or general designer.

Professor Ramsay's book has grown, in this third edition, from a slim and scantily reported series of of six lectures, to a real manual of geology, and one that cannot fail to take its place in the library as a work of reference. As regards stratigraphical geology, it is very certain we have nothing so good in the English language. This is a department usually too much ignored, all the attention being given to palæontological geology, or that part devoted to organic remains. Except Professor Juke's "Manual," we may be said to have had nothing which the student could really consult. Of Professor Ramsay's ability to treat on the combined sciences of Physical Geology and Geography, his position as Director of the Geological Survey of this country is sufficient proof. Few geologists have experienced more active or difficult field-work. And we regard the combined study of physical geography and geology as being as important as the twin studies of zoology and palæontology, to which we have alluded. Although professing to appear as a third edition, the book before us is practically a new book, with much new matter, new illustrations, and new arrangement. It is clearly and even pleasantly written, and our geological readers cannot fail to appreciate it.

Mr. Clifton Ward's unpretending little volume is just of the kind we should recommend to any young man who asked us what would be the best work for him to begin the study of geology with. The illus-

trations are numerous, and if they are not of such a high finish, they are telling. The book was originally given as a course of nine lectures on geology, and is specially adapted for the use of schools and junior students. We are sorry, however, that in his classification of the animal kingdom, Mr. Ward has placed the Graptolites among the Polyzoa. This is a mistake frequently made, but their common place is among the Hydrozoa, as they were undoubtedly allied to our modern sertularians, the chief difference being that they were free, instead of fixed. With this mistake, which we doubt not Mr. Ward will correct in a future edition, we have nothing but unqualified praise to bestow upon his work. Perhaps it would have been better had it stood alone, and without the "Geological Dream" being appended to it.

SELF-HEAL.

(*Prunella vulgaris.*)

SOME account of this plant, including the origin of one of its English names, "Self-heal," was asked for in the December number of SCIENCE-GOSSIP. As it has a variety of English names besides the above, I think a short history of the origin and meaning of them all will, perhaps, be interesting. First, however, as to the plant itself. The genus *Prunella* belongs to the natural order *Labiatæ*. It consists of herbaceous plants only, which are "distinguished by a two-lipped calyx, the upper lip truncate, three-toothed, the lower bifid; stamens ascending; style bifid."

We have only one native species, *Prunella vulgaris*, a very pretty though exceedingly common plant, found in rather damp and barren pastures, and very generally by the roadside; and in some counties, as, for instance, in Cheshire, when an old clay pasture is broken up for a crop of oats, the Prunella is often so abundant as to be, in some degree, detrimental to the corn,—a circumstance which has given rise to a name that will be mentioned hereafter. The plant grows five or six inches high, sending shoots out in all directions, which trail on the ground and take root at the joints, so that it very soon spreads considerably, and clings so tenaciously to the soil, that it is very difficult to weed it up without leaving a portion behind: our Cheshire labourers would say, "It's as ill as scutch." The whole plant is hairy, and it sends up many spiked heads of purple flowers, with a pair of leaves at the base of each spike. The plant is not altogether destitute of beauty, even when out of flower; for the calyx is persistent and becomes rather membranous, and when the flowers are over, the heads of dry calyces stand up like little brown turrets. I have always had an idea that our wild Prunella would be worth cultivating, and I suggested it in SCIENCE-GOSSIP a year or two ago; but I have not experimented upon it myself. Still it varies in colour from dark purple to light greyish-blue, and occasionally even to mauve and white: it flowers continuously from July to September; and I have little doubt it could be very much improved by cultivation, like most other things. In one of the early volumes of *Curtis's Botanical Magazine*, pl. 337, is figured *Prunella grandiflora*, which is remarkably pretty, and which some authors have thought to be merely a variety of our *P. vulgaris*. It suggests, at any rate, what cultivation might, perchance, do for our own wild species.

Fig. 21. Self-heal (*Prunella vulgaris*).

The old German and Dutch names of the plant were *Brunellen* and *Bruynelle;* in English, *Brunel* and *Prunell*, and in French, *Prunelle*, which, of course, were adopted from the German. The name arose from the use of the plant in curing the quinsy, or some other throat complaint. One of the modern German names of the quinsy is

"Bräune." Lyte (1578) says, "It is good to wassh the mouth often with the decoction of Prunell, against the ulcers of the mouth, and it is also a soueraigne remedie against that disease whiche the Brabanders do name den Bruynen, that is, whan the tongue is inflamed, and waxeth blacke, and is much swollen, so that the generall remedies haue gone before." A combination of nitre and sulphur, called "Sal Prunelle," is often used by old-fashioned people as a remedy for a sore throat. It is dissolved in the mouth gradually, and, I believe, has frequently a very good effect. The name, doubtless, has some connection with that of the plant, either because curing the same disorder, or from similarity of effect, or the drug may, possibly, have been sold as an extract of prunella.

The scientific name is not classical Latin. It is the old German name Latinized into *Brunella*, and softened into *Prunella*. The old herbalists give both forms as the Latin name of the plant. It was also called in Latin *Consolida media*, and was classed with the Bugle (*Ajuga reptans*), a plant which it somewhat resembles, as *Middle Consound*.

I think the name *Brunel* or *Prunell* is now quite obsolete, and I have no *record* of Self-heal being at present in actual use, though it is always given in botanical books as the ordinary English name, and may, possibly, still be known. The name "Self-heal" is found in all the old herbals. It means a plant with which one can cure oneself. Dr. Prior quotes an old French proverb given by Ruellius: "No one wants a surgeon who keeps Prunella." It was considered a specific for wounds. "The decoction of Prunell made with wine or water doth ioyne together and make whole and sounde all woundes both inwarde and outward as Bugle doth." *Sanicula Europæa* was also called "Self-heal" for the same reasons.

Several modern local names, however, point to the use of Prunella as a joiner of wounds. In Yorkshire and in parts of Cheshire it is called All-heal; around Belfast it is known as Touch-and-heal, a name given in many places to one of the St. John's Worts. In Cheshire it is most generally known as Carpenter-grass; and it is thought that if a carpenter cuts himself, the leaves will stanch the blood and heal the cut. In Gloucestershire it still retains a name given by all the old herbalists, Carpenter's Herb. One of its Cheshire names is Proud Carpenter. Why such an epithet has been added, or why the name has been so corrupted, I cannot explain: names very often do get thus capriciously altered, until there is very little left to show their original meaning. It is somewhat remarkable, too, that in Cheshire the word "carpenter" should be retained in the name of the plant, though a worker in wood is seldom or never so called, but is always spoken of as a "joiner."

Hookeheale and Sicklewort were also old names for Prunella. Lyte and Gerard both give the former, and Gerard the latter name. Dr. Prior thus explains *Hookheal*, "from its being supposed, on the doctrine of signatures, to heal wounds from a billhook, which its corolla was thought to resemble." He says of *Sicklewort*, "from the shape of its flowers, which, seen in profile, resemble a sickle." A *badging-hook* and a sickle, both instruments for cutting corn, certainly resemble each other, and a badging-hook is often used for trimming hedges; but an ordinary *bill-hook* is very different; so that the flower could scarcely resemble both a billhook and a sickle. The fact of the plant often growing amongst corn, and its known use as a wound-wort, may have induced men to look for its "signature;" still, although the corolla of each flower does curve in the form of a hook, I hardly think the resemblance is sufficiently striking to have been regarded as an indication of its use; besides which, there are scores of labiate plants in which the resemblance is quite as striking, or more so. I think, most likely, both names simply refer to its use by reapers when cut with a hook or a sickle, and it would generally be at hand for the purpose.

Gerard also calls it, in the appendix to his Herbal, Pimpernell,—a name then and now generally given to *Anagallis arvensis*, but sometimes to *Pimpinella saxifraga*, an umbelliferous plant. In the herbals Poterium is Pimpinell, which is derived from the middle-age Latin *bipennella*, variously corrupted into *pampinula* and *pimpinella*, and refers to the leaflets of a pinnate leaf. This derivation is correct as regards Pimpinella and Poterium, both of which have pinnate leaves; but not as regards Anagallis or Prunella. The latter, however, may have been confused with Sanguisorba (*Poterium*), because both were specifics for stanching blood and healing wounds.

A Gloucestershire name for Self-heal is Fly-flower, perhaps from a fancied resemblance of its flowers to those insects.

Johnstone, in his "Botany of the Eastern Borders," calls it Prince's Feathers and Heart-o'-the-Yearth. The first of these names is given in other places to several other plants, and I cannot tell why it is transferred to this, as it does not in the least resemble them; neither can I explain the second name, unless there may be an idea that it is an exhausting weed, taking the best ingredients out of the soil. An Ayrshire name is London Bottles, which may be given as a distinction from the ordinary Blue-bottles (*Centaurea cyanus*), though there is really no resemblance.

The last name I have on my list is Pickpocket, which is in use in Essex. This is a sort of generic and very expressive local name given to several agrarian weeds which injure the farmer by taking

the best ingredients out of the land. Amongst the plants thus stigmatized as pickpockets is Corn Spurrey (*Spergula arvensis*), which is a very troublesome, choking weed in sandy soils. I mentioned that in certain soils Prunella was very prevalent as a corn-weed, and that it was difficult to eradicate, which circumstances have, no doubt, combined to give it the name it still bears in Essex.

ROBERT HOLLAND.

THE PHILOSOPHY OF NATURAL HISTORY.

AMONG other definitions of philosophy, Dr. Johnson, in his world-famed dictionary, tells us that this word means "an hypothesis or system upon which natural effects are explained," and surely there is no branch of philosophic study which is more open to individual effort or genius, or which owes more to the industry of what the world would term "common-place" intellects, than the science of Natural History. In the study of the world's products and components every lover of Nature may find a grade suited to his ability, and a section in accordance with his taste, and that man is much to be pitied who devotes himself entirely to classical lore, or commercial pursuits, to the exclusion of natural science. It is my intention to bring before the readers of SCIENCE-GOSSIP, within the limits of the present article, some facts and hypotheses which, if not entirely new, are at least sufficiently undeveloped to present matter for the consideration and attention of thoughtful minds.

It has probably not unfrequently occurred to most people as a very strange thing that so much pain should be suffered by animals lower in the scale of creation than man, without apparently any of the compensating advantages enjoyed by the latter. Surely there cannot be any doubt as to the capabilities of such enjoyment possessed by the animal world, for no one who has heard a cat purr will deny that the feline tribe at any rate are susceptible of pleasurable sensations. What says analogy? Does the pig, grovelling in the mire of his sty, enjoy himself less than the glorious peacock, sunning his train on some conspicuous eminence; or does the pleasure experienced by an athlete, in going through his *pentathlon*, exceed the calm delight of the philosopher, cooling his heated brow, "*sub tegmine fagi*"? Surely not. How is it then that animals in their natural state appear to have so little happiness and so much pain? Let us picture to ourselves the evening scene in a tropical forest. The fiery sun, like a red-hot ball, drops behind the western hills, and night falls suddenly on the jungle world. Then the butterflies close their wings, and resign their posts to the radiant fire-flies, and the kings of the forest, who have been purring away the noonday heat, surrounded by their frolicsome cubs, emerge from their cavernous dens, and roar for ththeir challenges on the nearest hillocks. Then the denizens of the jungle, collecting in one immense herd, march down the well-beaten track to the river or streamlet, which is always found in close proximity to the forest, for the purpose of taking their nightly drink, and to lave their fly-tormented hides in the cooling stream. Having quenched its thirst, each creature proceeds to do that which is right in its own eyes, and, unfortunately for the peace of the community, the hungry carnivora commence to fall upon their prey.

It is in vain that the timid antelope urges that it has as much right to live as the most voracious lion that ever breathed; it is in vain that the wild-cat claims consanguinity with the tiger about to devour it. Might is in the ascendant, and from might there is no appeal. Consider what a frightful amount of pain is occasioned in this way, or, to speak more correctly—if we adopt the hypothesis presently to be set forth—is apparently occasioned, in each acre of tropical forest every night of the year. Now, every thinking naturalist must often have asked himself—"Is this so? Would a merciful Providence have ordained that the sparrow should be reared only to perish in the talons of the hawk, or the gazelle only to be torn in pieces by the lion, if a happy immunity from pain did not accompany their untoward end?" It is true that animals instinctively avoid the carnivora which prey upon them, but if this be taken to prove that their death is a painful one, we must infer that some mode of communication exists among dumb animals enabling them to communicate nervous sensations to one another—a thing which human beings find difficult to do. All living creatures, except, perhaps, the zoophitic classes, and also many plants, avoid death-giving agencies; but this dread is innate in the organic system, though, perhaps, it can scarcely be reckoned among the functions of instinct, as that term is generally understood, inasmuch as it exists in forms of animal and insect life too low in the scale of existence to have any other nervous characteristics.

So far, however, the evidence is of a negative kind, and only goes to prove that we are mistaken in our estimate of the amount of corporeal suffering existing among animals, and some theory must be set forth which may serve as an explanatory key to unravel the mystery, and which may shed a fresh light on a subject concerning which we can only deplore our ignorance. The most circumstantial evidence points to that marvellous but little-understood power which goes by the name of fascination, as the provision which Providence has instituted for the humane purpose of lessening animal pain. To understand this power rightly, it is necessary to

investigate the habits of the snake tribe, in which it is especially apparent. Many reptiles of the venomous class, and some that are harmless, when alarmed or angry, coil themselves up in the form of a cone, and then raise the head and neck from the centre of this coil, hissing at the cause of their disturbance; other snakes strike their foe at a bound, using the tail as a fulcrum; but the majority glide rapidly along the ground until within a few feet of their intended victim, and then elevate the head and glare steadily at the wretched creature, who is quite unable to escape, being apparently glued to the spot where it stands, and trembling violently in every limb.

When this state of things has existed for a few moments, the snake darts forward, and either gulps down its prey at once, or, if it be of a larger size, strangles it in a cold embrace. Mr. W. Wood, in his "Zoography," says that in South America rattlesnakes and other serpents are universally believed to have the power of charming or attracting small animals. When a hungry reptile wishes for a meal, he lies down at the foot of a tree, and, as soon as a bird or a squirrel notices this, it skips from spray to spray in wild excitement, hovering and approaching gradually nearer to its enemy, regardless of any other danger, until it gets within a few inches of the snake's jaws, and is immediately snapped up. Mr. Pennant gives a similar account, and describes the serpent as lying at the bottom of a tree on which a squirrel is seated, and then exercising its fascinating power to such purpose that the animal, becoming stupefied with terror, loses its balance and falls to the ground, where it lies an easy prey to its snaky foe. A writer in a recent number of a periodical corroborates these accounts, and states that he himself has witnessed the same thing. It would appear, then, that the organ through which this fascinating power is chiefly exercised in the serpent tribe is the eye, of all the organs of sense the one most intimately connected with the brain. On turning to the structure of the optic nerves, we find that the size of the pupil is varied by the action of the muscular fibres composing the iris. When the latter is exposed in a brilliant light, the circular fibres contract, while the radial are relaxed, and thus the size of the pupil is diminished; on the other hand, when the object viewed is obscured by the gloom of night, the radial fibres contract, whilst the circular are relaxed and the pupil is enlarged. In this well-known fact we find at least one of the reasons why the carnivora catch their prey by night, for the pupil of the eye being larger than in the day, more light is admitted, and probably its fascinating powers become greater. But if these powers are exercised by snakes through the eye, there is no evidence to show that other animals do not possess the same property and make use of it in the same way, and no one who has seen the domestic cat crouching down, preparatory to a spring, trembling in every limb with nervous excitement, and flashing fire from its voracious eyes, can doubt that the genus *Felis* at any rate exercises mesmeric influence in this way.

But in all probability fascination is not confined to the eye. A snake or a tiger may in this way prevent the escape of its victim, but when once it is caught, and the charming effect of the gaze is at an end, the wretched creature, unless entirely panic-stricken, must experience great bodily suffering. It is known that the nerves contain a peculiar fluid which is not found in other parts of the body, the composition and physical characteristics of which are very little known. Moreover, we know that when a nerve is frozen, whether naturally or artificially, it may be cut or otherwise injured without any sensation of pain being produced. In a late number of the *Popular Science Review* there is an admirable article by Dr. Richardson, F.R.S., in which he says that in his opinion the visible nervous fluid "is not of itself sufficient to act as a subtle medium that connects the outer with the inner universe of man and animal. . . . There must be another form of matter present during life, a matter which exists in the condition of vapour or gas, which pervades the whole nervous organism, surrounds, as an enveloping atmosphere, each molecule of nervous structure, and is the medium of all motion communicated to or from the nervous centres." Pain, according to this writer, is the result of very rapid vibration of the nervous ether, and if this vibration, which may be caused by a blow, or by violent mental emotion, is so rapid that the brain cannot receive it, pain is the result. The nerves bleed, and if the "tension of the ether" is too high, it causes unconscious convulsion.

Thus we see that there is strong presumptive evidence for believing that when the victim is under the paws of its devourer the fascinating process, so far from ceasing its operations, is in reality doubled, and this holds good, no matter what theory of nervous sensation we may adopt.

It is true that men have suffered pain when wounded by wild beasts, but then man is a strong-minded reasoning being, and, instead of surrendering himself to the fatal influence, he would naturally make every effort to escape. But, if the matter were investigated, I think it would be found that in the large majority of cases people have experienced no pain whatever at the time, though the wounds received may have been fatal. I could cite several such cases. This is a comfortable reflection when we remember that during three years in British India alone more than 12,500 persons were devoured by wild animals, exclusive of more than double the number killed by snakes. With this we must leave the subject, in the hope that some of our eminent

savans may take up and thoroughly elucidate this interesting question.

Blackheath. E. C. Lefroy.

INSECT NETS.

As I was much dissatisfied with the nets in ordinary use, the light ones being fragile and the strong ones weighty and inelegant, I constructed one which answers all the requirements of those who have used it. I have therefore ventured to describe it for the readers of Science-Gossip. The net should be scarcely more than half a yard deep, and its circumference at the mouth should not exceed one yard. To make a strong tube for the admission of cane, stitch a "false hem" of calico

Fig. 22. New Insect Net.

partly round the mouth, leaving a space of five inches between the open ends of the hem. Upon the space not hemmed stitch a piece of strong tape, and secure it to the calico at each end. Pass through the hem a piece of cane of such a length that six inches of it may project from each opening. Next procure a rod of bamboo, not more than three feet long, and scarcely exceeding half an inch in diameter. Insert a cross-piece of cane, six inches long, into a hole cut with a small knife (either gimlet or awl would split bamboo), through the rod near its smaller end (as at fig. 23), and with a small quantity of fine brass wire bind it in strongly and neatly, having previously notched both cane and bamboo to prevent the wire slipping. Fig. 24 will show how the parts are put together. Both cane and bamboo should be cut flat at *a*, *a*, the former very much, and the latter only slightly, on account of its thinness. Use either wire or waxed string for binding. To prevent the wire slipping, it will be necessary to notch both bamboo and cane at *a*, *a*; but at *b*, *b*, the cross-piece only must be notched.

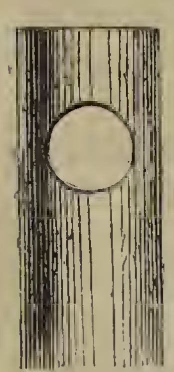


Fig. 23. Perforated Handle of ditto, natural size.

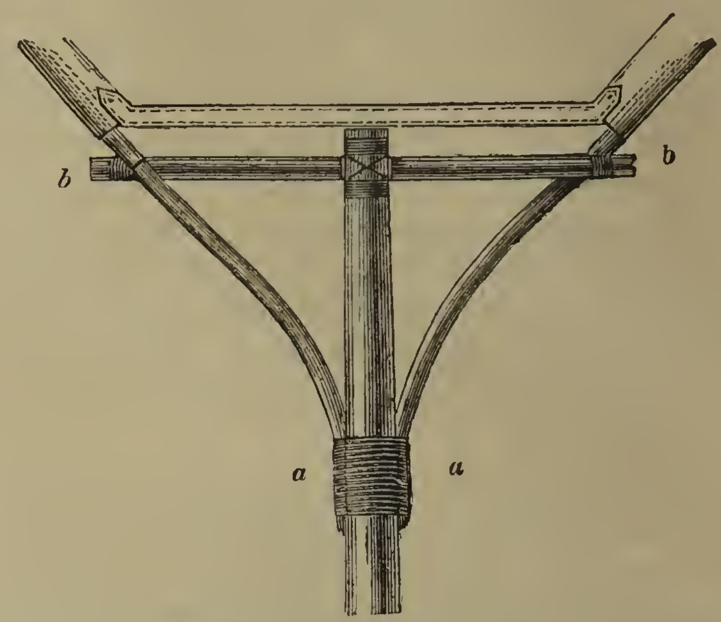


Fig. 24. Upper portion of Handle of ditto, illustrating construction. Scale $\frac{1}{3}$.

It may be said that this net is absurdly small; however, its convenience lies in its smallness, as experience with it will show. It weighs only four and a half ounces, and can be made in an hour, at the cost of not more than a shilling.

Frank Allen.

THE SAW-FLY.

In the July number of Science-Gossip (1872) I mentioned the fact that it seemed impossible that the egg of the Saw-fly could pass along the saws during its deposition into the slit made by the insect for its reception. Since then I have obtained several flies, and have watched them deposit their eggs, but have always observed that after the slit has been made in the leaf, the saw is withdrawn into its sheath, the body of the insect is curved downwards, and an egg is then deposited.

Fig. 25. End view of Terminal Segment of Yellow Saw-fly, showing saw in natural position when not in use.

Dr. Carpenter, in his work on the microscope, says that "when the perforation has been made the two blades are separated enough to allow the passage of the eggs between them."

Mr. Jabez Hogg states "that when the cut is made, the four are drawn together; and through a central canal which is now formed by combining the whole, an egg is protruded into the fissure made by the saws in the leaf." Mr. Wood, in "Insects at Home," makes use of this sentence—"an egg is then passed between the saws and deposited in the groove, &c."

It may seem presumption on my part to question the statements of such authorities as are above quoted; but yet, if we take into consideration the size of the egg and the formation of the saws, it is quite impossible for the process to be accomplished in the manner they describe. The cavity of the body has no outlet through the saws, the bases of which are filled up with the powerful muscles destined to move them. The first mention I can find of the saws acting as ovipositors is in an old book on insects, by J. Hill, M.D., published in 1773. He says, in describing the Saw-fly, "The fly is female that is here described; the male has no saw, for he has no use for it. Nature has given that instrument to the female, to cut a way into the growing vegetable, and there to lodge the eggs, which pass through the hollow made by the two sides or plates of the saw."

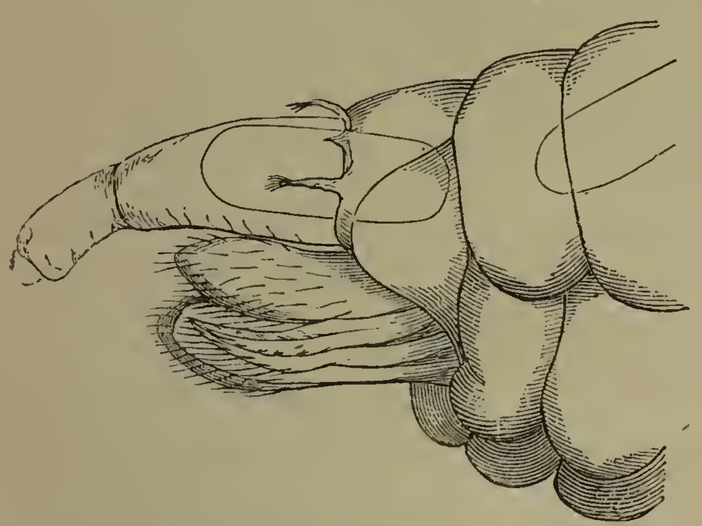


Fig. 26. Terminal Segment under pressure, showing protrusion of Ovipositor, and the passage of egg through it.

By soaking a female saw-fly, full of eggs, for a few days in liquor potassæ, its skin becomes soft and transparent, and the eggs can be seen lying inside the body. By subjecting it to gentle pressure under the compressorium, and using a microscope having a low magnifying power, a tube is seen protruded from the end of the abdomen, and along it the eggs can be seen to travel (fig. 26). This is probably the true ovipositor.

In the natural position, when not in use, the saws are contained in a sheath, situated in a slit at the termination of the body of the insect. Over this is placed a sort of arch, formed by the terminal segment of the body. From this arch springs on each side of it an organ resembling an antenna, the use of which is, no doubt, to find the position of the slit made by the saw before an egg is deposited. (See fig. 25.) It is under this arch that the real ovipositor is protruded. If any of the readers of SCIENCE-GOSSIP have made any observations on the structure of these organs of the Saw-fly, it would be interesting to me to learn the result of their investigations.

JAMES W. GOOCH.

A NUT-STOWING BIRD.

THE subject of this article is one of my peculiar pets, and a bright, handsome merry fellow he is, with his coat of sober grey and his waistcoat of orange. Ever active, never at rest, ever prying and peeping, he manages at all times to keep his sleek self in a very plump, well-to-do condition. On the mossy trunks of apple and pear trees in neglected orchards he regularly runs riot, and in well-timbered parks his merry twit-twit! rings out as joyously as the song of the "mounted thrush" or the carol of the "heaven-aspiring" lark. He is essentially a joyous bird. There may be little of music in his simple note, but what there is smacks of genuineness, which is more than can be said of many of the trillers and warblers of our own species, whose merry songs often gush from a grief-laden heart. His active and inquisitive disposition is also beyond dispute. All day long he flits from tree to tree, climbs the bole, hangs back—downward from the branches—at the same time peering into every cranny with a perseverance worthy of a higher object than securing a few woodlice, grubs, and beetles. But this is his only object, for hasn't he to keep up his own plumpness, and are there not five or six queer little creatures at home whose well-being and *embonpoint* depend principally on his success in entomological pursuits? Accordingly our little friend pecks, taps, twitters, and pries the livelong day.

But though insects are the staple food of our active little friend, yet at a certain time of the year he becomes, both in principle and practice, a vegetarian. Into this absurd notion he enters heart and soul. His mania is for nuts, and from this he derives his name, which is *Sitta Europæa*, the Common Nuthatch—nuthatch, literally rendered, signifying "to chop a nut." At that time of the year when the sun-embrowned clusters of ripe filberts, hazels, and cobs coquettishly peep from the coppice and hedgerow, our little friend wings his way from the park and orchard, and from among the clustering treasures and fading leaves twitters right merrily. Selecting one of the finest of the bunch he takes it into his widely-gaping beak, and once more addresses himself to flight. Presently a loud tapping is heard from some quiet corner, and

if we cautiously approach we shall see the author of the noise, to wit, our grey-coated friend, clinging to the trunk of a tree, and vigorously striking at something wedged in the bark. This something is the purloined nut, which the knowing bird has firmly introduced into a cleft of the bark. Then taking his station head-downward over the nut, he hammers away with his powerful bill (aiding each stroke with a clapping of the wings) till the hard shell gives way, and the dainty kernel is his reward. Just as the Thrush retires to the old stone or stile to break up the homes of garden and belted snails, so does the Nuthatch retire to his corner to feast on the juicy kernels, and neither of their workshops I may say, is conspicuous for tidiness.

flew up, and, placing something on a potato mound, gave it several taps with its beak and then flew off. Marking the spot, I searched and found a small but full-kernelled nut just beneath the surface. Soon after I found six others nuts buried separately, but not far from the first. I once noticed him as late as the 1st of November burying a nut in a flower-bed. He dropped it on the gravelled path, and then took it up in his beak, placed it on the soft earth, and tapped it several times, afterwards drawing the earth and leaves together as if to conceal the place from other prying eyes. Besides hazel, filbert, and cob-nuts, he likewise stores away acorns and beech-masts. In December and January our nut-cracking friend remembers his autumn labours, and turns

Fig. 27. Nuthatch (*Sitta Europæa*).

At the time of writing this my little friend is in the midst of his nut-collecting and nut-breaking operations, and judging from what I have seen of his movements, he will be little troubled by the scarcity of nuts. Notwithstanding his liking for the dainty kernel, he has an eye for the future, and sacrifices part of his present enjoyments for future "rainy days," when insect life is asleep and hidden away even from his inquisitive eyes. Accordingly our provident little friend, squirrel-like, stores away the superfluous nuts, and dozens of times have I noticed with pleasure his dexterity in so doing. His hiding-places for his nuts are everywhere—in the earth, in flower-plots, under bushes, in chinks of walls and spoutings, under moss, tufts of flowers, and at the roots of box edging. On September 23rd last, while employed in the garden, a nuthatch

them to good account. He may then be seen searching among the flower-plots, and having disinterred a nut bears it off triumphantly in his bill to be dexterously cracked and daintily eaten.

This unique habit of storing away food is, we believe, peculiar to the Nuthatch, if we except the acquisitive disposition of the tame *Corvidæ*.

Kingston, Abingdon. W. H. WARNER.

A GOSSIP ABOUT RARE PLANTS.

YOUR correspondent F. Arnold Lees, in his article entitled "Recent Records of Rare Plants" (January No., pp. 1—3), mentions *Helianthemum Breweri* as "rendered almost if not quite extinct" at Holyhead through the operations which have effected such notable changes in commercial

and manufacturing neighbourhoods in these utilitarian days. I am glad to be in a position to inform him and others interested in such matters, that the above-named rarity must not be at present —and I see no reason for it to be for many a long day to come—included in the catalogue of "lost species" from the cause named. During a short excursion to Anglesea in the month of August last, in company with Mr. H. S. Fisher, we made a special point of searching for this rare species, and, coming down the mountain-side immediately above the South Stark Lighthouse enclosure—about halfway down to the roadway—we found it growing in tolerable plenty upon the ledges of rock where there was any slight covering of the heathy soil. At the time of our visit the plant was a full six weeks past its best, and the larger specimens were nearly all withered and not worth gathering; but of seedlings, a quarter-inch to one inch high, hundreds might easily have been picked. I hope that this statement will not lead in any way to that most-to-be-reprobated cause of botanical losses, and of vexation to botanists — the scarcity of botanical treasures through the rapacity of collectors who visit localities of rare plants, and gather without consideration of those who will succeed them. The Helianthemum also grows—but very sparingly and very small—in the mountain gully which opens on to the road shortly before coming to the steps which lead down to the Lighthouse buildings. This habitat has been in print a good many years. I cannot say whether it holds its ground at Almwch, the only other distinct station recorded for it, and shall be glad to know if it has been gathered there in recent times.

I believe that Mr. Lees is correct in classing *Cineraria maritima* with the defunct rarities so far as the old Holyhead locality is concerned, also that he assigns the correct reason for its loss. I some time ago identified the habitat particularized by Davies in "Welsh Botanology," and had no doubt that the harbour improvements had quite destroyed the plant, so that I did not think it worth while to examine afresh this year.

There has been doubt expressed by some whether *Elatine hydropiper* was still to be found in its Anglesea locality of Llyn Coron (or Llyn-Cwm, as given in Hooker's "Student's Flora"). We found it, but in much smaller quantity than its near relative, *E. hexandra*, which was obtainable in plenty by wading some six or eight yards into the lake, at its south-east border. It may be a serviceable piece of information to some to tell them that, when gathering the Elatines, the small Callitriches, and other plants that grow in shallow water partly imbedded in the soft soil at the bottom, the best plan is to bring up a good handful of the plant and soil together, and by a gentle movement of the hand through the surface-water wash away the soil or mud. The specimens in a perfect state will float out during this operation, and should be picked up carefully, so that the slender stems do not run together, each specimen being laid, there and then, between pieces of paper, and deposited in the vasculum, unless the collector possesses a collecting-book. The trouble is very trifling, and, instead of a shapeless mass of mere fragments, as are the generality of the specimens of small water-plants, we have perfect and clear specimens. Those who have seen the specimens of the Elatines distributed by the late Mr. Salmon, or Mr. Stratton's specimens of *Chara alopecurioides*, will know what a little care and judgment can accomplish.

Whilst upon the subject of Anglesea plants, I wish some of your readers could throw light upon the record of *Trifolium strictum* as an Anglesea species; this either by conveying their knowledge through your pages, or by referring me to sources whence I can obtain a reply to the following queries:—Where did the record first appear? Was an exact locality described? Were specimens distributed to botanists? Was the plant considered to have native claims, or was it traced to a casual introduction? and, finally, Was the correct species given, or was a more common trefoil found and the name *strictum* wrongly applied? Mr. Watson, in his Compendium to his "Cybele," says, "Once seen in Anglesea;" and in his Supplement gives the authority, "Dr. Dickenson." This is all I know about it, except that I have in memory the locality was stated to be near to Aberffraw, and I also think it spoke of the plant occurring over a considerable, but a circumscribed, extent of ground.

I may mention that *Rosa Wilsoni* still flourishes in its original locality by the Menai Straits, but a notice-board close by bears the ominous intelligence —"Eligible building land to be let on lease," &c.

F. M. Webb.

THE SKULPIN.

THE *Callionymus* and *Uranoscopus* mentioned by Pliny (Hist. Nat., lib. xxxii. c. 24) are identified by M. Ajasson with the white Rascasse of the Mediterranean, and I think we may look for its identification in this fish rather than in the Yellow Skulpin, according to Couch. M. Ajasson remarks (see notes to his edition of Pliny) that the former fish has the eyes so situated on the upper surface of the head as to appear to be gazing at the heavens. At Genoa this fish is commonly known by the name of *prete* (priest). It belongs, no doubt, to the Linnæan genus *Uranoscopus*, the principal characters of which are the vertical position of the eyes and mouth. The members of it are found, too, in the Mediterranean Sea. We believe this is the only genus among fishes in which

the eyes are *directly* looking upwards: in the Ray and *Callionymus* their direction is oblique. Our figure is that of *U. scaber*, Linn. We think it is more probable that this fish is the *Uranoscopus* of the ancients than that the Yellow Skulpin is. Indeed, as Pliny does not give us a description of it, but merely points out the remarkable position of the

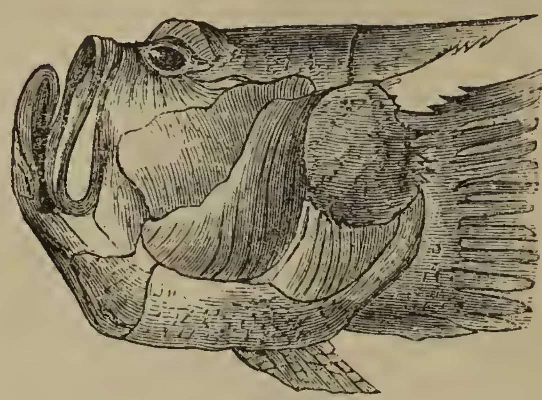


Fig. 28. *Uranoscopus scaber*, or "Star-gazer."

eyes—seldom seen throughout the range of the animal kingdom—and its remedial properties, it is almost impossible to identify it. Aristotle, in his "History of Animals," does not appear to mention it. Probably some of your readers can enlighten us as regards the "white Rascasse of the Mediterranean." E. HALSE.

LAMP SHELLS.

AMONG the commonest fossils the geological student meets with, either in the primary or the secondary rocks, but more particularly in the former, are those commonly termed "Lamp Shells" (*Brachiopoda*), from the supposed resemblance of some species, such as the *Terebratula* (fig. 29), to an

Fig. 29. *Terebratula biplicata*—a common oolitic fossil.

ancient lamp. The resemblance is only approximate, and you must invert the shell, so that the beak, with its perforation, may be uppermost, and then the fanciful likeness to a classic lamp is seen.

Whether in the Silurian or Carboniferous limestones, these shells form the chief spoil of the young geologist; and when he has acquired sufficient zoological knowledge of existing species, he will be surprised at the persistence of form which has marked the life-history of this group more than any other. With the exception of certain genera to which we shall shortly advert, many of the Palæozoic, or most ancient of the "Lamp Shells," can hardly be distinguished from those still living. They are among the oldest British fossils, and, from the time of the Upper Cambrian to the present, we never lose sight of them. In the Silurian seas, the "Lamp Shells" were in a tremendous majority, the bivalves not attaining anything like the same specific or numerical abundance. Since then, the latter have been gradually gaining ground, until in modern seas it is they, and not the "Lamp Shells," that are overwhelmingly abundant. The "Lamp Shells" now occupy isolated areas, and live in scanty colonies along the deeper parts of the sea-bottom. They are geographically isolated, and found in northern as well as southern seas. This widely-separated distribution of forms of life nearly allied may always be accepted as indicating their great geological antiquity.

To meet with a few small living specimens of *Rhynchonella* or *Crania* in British seas now is almost a "find" to the dredger. Contrast this fact with the fossil forms in the Silurian, Carboniferous, and Oolitic limestones, where the rock is frequently composed of nothing else than the accumulated remains of allied species!

Beautifully shaped and ornamented though the "Lamp Shells" are, they are lowly organized, when compared with such bivalves as the common Pecten or "scallop." When anatomically studied, they are found to have a greater affinity to the "Sea-mats" (*Flustra*) than to the bivalve shells they so much more resemble. Most of them have the beak perforated, and this peculiarity marks the earliest *Terebratula* we meet with. Indeed, the name of this genus is taken from the small perforation. Like the hole in the under valve of the little *Anomia*,

Fig. 30. *Pentamerus Knightii*. Fig. 31. *Lingula Lewisii*.

this perforation had a plug passing through it, with a sucker at the end, by means of which the animal was enabled to anchor itself, just as the common mussel does by its "moss" or *byssus*. The scientific name of *Brachiopoda*, or "arm-footed," which the family possess, is derived from two coiled-up processes called "arms," which the animal can uncoil and use to obtain its food. These ciliated arms are also utilized as lungs, so that breathing takes place as well as locomotion and food-catching. The mouth is situated at the base

of these arms, and this opens into the gullet. All the embryos of these more or less fixed "Lamp Shells" are free-swimming creatures, moving through the water by means of cilia. The nervous system in the adults is not nearly so highly developed as in the true bivalves. One of the oldest and most persistent genera of "Lamp Shells" is undoubtedly the *Rhynchonella*, which may easily be recognized by its ribbed and "cockle-like" appearance. Numerically, also, it is perhaps the most abundant of any of its kind in the older rocks. One species found in the Upper Chalk formation (*Terebratula lineata*) is believed by our best palæontologists to be specifically identical with the living *Rhynchonella caput-serpentis* of our British seas.

striated, especially in the above species, which is one of the largest. The coils are calcareous in their structure, and were used for the support of the "arms" above mentioned. In the chert beds, which are frequently found intercalated in the older limestones, just as the flint bands are in the chalk, these spiral coils are usually met with in the best preserved state, and often silicified. It is only by carefully chipping away a portion of one of the valves that the coil may be seen, and, unless found in the chert beds, you may open scores without finding it.

Of the numerous species of *Brachiopods* besides the above, space forbids us to do other than merely refer to their existence. Few creatures have done

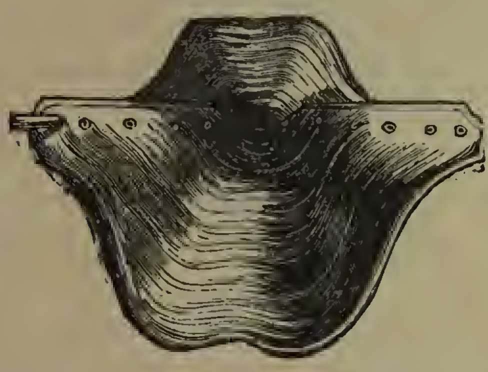


Fig. 32. *Producta horrida*, a characteristic Permian fossil.

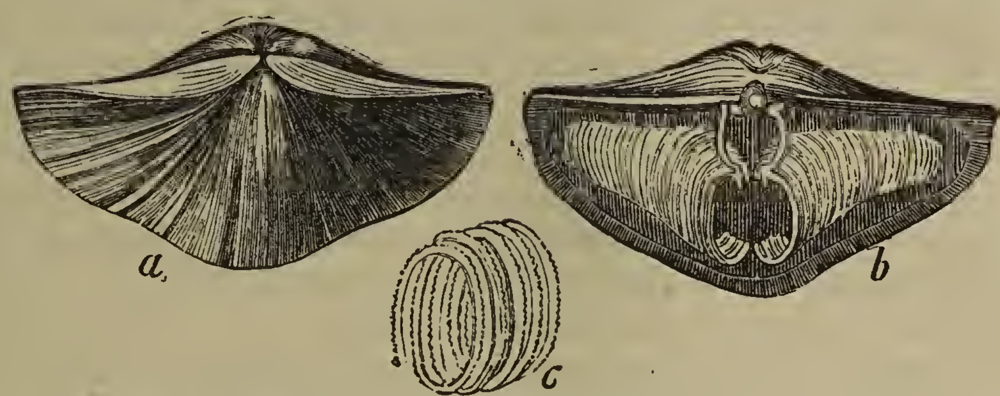


Fig. 33. *Spirifer striatus*, Derbyshire; *b*, valve showing internal coil; *c*, portion of coil.

The *Lingula* (fig. 31), or "Little-tongue," as the name aptly signifies, is even geologically older than the *Rhynchonella*. It is still in existence, but only to be met with in southern seas, although it lived in British waters as late as the Coralline Crag. It is so abundant in the Upper Cambrian formation that this deposit, six thousand feet in thickness, goes by the name of the "Lingula flags." The *Pentamerus* (fig. 30) is so called from its internal arrangement of the septum, by which the cavity is divided into four chambers, one of the two valves having an additional chamber. This five-parted division is caused by the greater development of the internal plates, and the fact, expressed by two Greek words, has given its name to the genus. It is very abundant in the Upper Silurian beds, especially in the Aymestry limestones.

The *Producta* (fig. 32), from a Latin word signifying "drawn out," in allusion to its usual lateral extension, is one of the most characteristic shells of the Carboniferous limestone, where, both in specific and numerical abundance, it seems to have outstripped all its contemporaries. One species, *Producta gigantea*, found plentifully in the neighbourhood of Buxton, Derbyshire, often attains the size of a child's head. A peculiar species, *P. horrida*, is very characteristic of the Permian strata. But perhaps the most interesting of the ancient *Brachiopods* is the *Spirifer*, which takes its name from the spiral coil often to be found within it (fig. 33). The hinge is very broad, and the valves are strongly

more towards building up the solid structure of our continents than these insignificant shells, and therefore they acquire an interest transcending even that of their vast antiquity. J. E. TAYLOR.

GOLD-TAILS AND BROWN-TAILS.

THE two closely-allied species, *Liparis auriflua* and *chrysorrhœa*, have much in their economy of considerable interest; nor have all points therein undergone due investigation. This may partly be explained by the particularly unpleasant effects produced by the larvæ upon the human skin. The Rev. J. G. Wood gives us a melancholy record of his experiences when he attempted the task of dissecting and stuffing some of these; and through a misapprehension as to the real cause of the painful swellings produced, it was not until the third attack that the poisonous "Gold-tails" were convicted as the offenders, and carefully avoided by him (no doubt) in future. And Mr. Moncreaff informs us that he—rash man! collected about two hundred of them "for investigation." Unfortunately, a double investigation went on, and while he was investigating the caterpillars, their hairs, or somewhat detached from them, investigated his skin, and the irritation made him seriously unwell for a time. He found that the virus (whatever it might be) continued to hang about the box in which they were kept for some six months afterwards. Mr. Mon-

creaff adds a fact worth remembering; namely, that of all the remedial applications he tried, a bruised dock-leaf was the most effective.

This gentleman's conclusion as to the cause is, that it is produced by the hairs, which, when they are separated, either through the moultings or by the insect forming its cocoon, shortly become dry and pulverulent, and when set in motion attach themselves in minute particles to the face or hands. But we are still in doubt as to "the reason why." There must be some quality in this powdery substance which gives it this disagreeable activity. And again, one asks: "As this influence produced upon the human subject can hardly be the sole purpose for which the caterpillar possesses it, in what way does it operate otherwise for the defence of the creature; does it, for instance, prevent birds from seizing gold-tail caterpillars?" From the colours of the caterpillar, it is certainly exposed to special danger when near maturity.

We find three hypotheses have been presented for our consideration: that already noticed, which connects the urticating effect with the hairs, and which has this in its favour, that it is at those times when the hairs are shed the caterpillar is most undesirable as an acquaintance. Others have, however, ascribed its property to the separation or discharge of some powdery substance, or scales, or flakes, when it is irritated or alarmed. And yet again others, turning from solids to fluids, imagine that an acid secretion is the agent, which the caterpillar fires off, in the manner of our well-known and comical-looking caterpillar, commonly called the Puss. It is rather against the latter supposition, that so extensive an effect is produced on the skin as often happens. Like the gentleman already mentioned, I have attempted some dealings with the species in its larval stage, in order to elucidate this, and other puzzles in its history. But I must own that the result of nurturing it in confinement was sufficiently painful to compel me to turn out my captives ere the experiments were completed, and I, for my part, now leave the practical part in the hands of those who are almost callous to this annoyance; for there are some persons so far fortunate—whether it is because they are thick-skinned, I cannot determine.

Some particulars I was able to ascertain, though it might be scarcely wise to generalize from these. The young larva in the autumn seems to cause little, if any annoyance, not even at the times of moulting; and the effect at a later period is more marked upon a moist skin, with a high temperature, than in cool weather, when the surface of the body is drier. Examination of the skin of the face while in a state of irritation failed to show any hairs or particles discernible by the naked eye; but a magnifier was not applied, which would have been helpful.

A correspondent of SCIENCE-GOSSIP has recently remarked that the "Gold-tail" caterpillar ought not to be placed among web-weaving caterpillars, since all it spins is a slight cocoon for its protection during the winter. This accords precisely with my own observations, and yet in many authors we find both this and the "Brown-tail" spoken of as gregarious, and therefore as architects of a common abode for their accommodation and protection. Rennie, indeed, figures the nests in his "Insect Architecture," and states that the broods of the "Gold-tail" and "Brown-tail" pass the winter in closely-woven nests, and corroborates this by the assertion that he observed at least twenty of these in the winter of 1828. He could hardly have been mistaken, nor is it credible that he would wilfully falsify facts; but it is possible that the species have somewhat modified their habits since our winters have been milder. Forty-four years have made some difference in our climate, and I think it must be admitted that we have less cold weather now than formerly, and also that mostly our winter sets in later. I should suppose, therefore, that from this cause the caterpillars feed on farther into the autumn, and, having scattered about, each one subsequently spins up a small cocoon for itself, in which it casts its skin, and then forms an inner cocoon. The observations of other entomologists may put the matter in a different light, but whenever I have found these, either in autumn ere hybernation, or during the spring and summer, they have been solitary.

To distinguish these two nearly-allied species is a difficulty to the beginner, especially in the caterpillar state. And even with the moths we are liable to err, for the chief distinction is the colouring of the tuft at the tail; and though between a golden hue and a golden brown there is a marked difference, I have seen specimens in some series of these insects seemingly intermediate in tint. The black spot, however, always to be found at the anal angle of the fore-wings in *auriflua*, is scarcely ever present in *chrysorrhœa*. The latter I take to be on an average the larger insect; and thus I differ from "Stainton's Manual," which gives us a statement just the reverse. The caterpillars have a close resemblance, only in the "Brown-tail" the red stripe on the back is less distinctly defined; and, taken altogether, it appears to a judge rather more gay in its colouring, when placed beside its relative. As to food, the "Brown-tail" shows a penchant for willow and oak, also the blackthorn, being rarely seen on the whitethorn, which is so generally favoured by the "Gold-tail" caterpillar. J. R. S. C.

"THE most difficult thing a person experiences, who comes into contact with geological teaching for the first time, is the demand made on his imagination for the article of Time!"—Taylor's *Geological Stories*.

TAME SPIDERS.

LOOKING through the back volumes of SCIENCE-GOSSIP, I see much interesting matter has been written concerning Spiders and their poisonous apparatus; but perhaps what I am about to write, showing that even these creatures, predaceous and cannibals as they are, can be tamed to a certain extent, will not be wholly uninteresting to some of your readers.

The history of the species which is the subject of the following remarks is as follows :—Searching for beetles one day in April, I happened to turn over a large stone, in a somewhat deep recess of which, guarding a dirty antique-looking web, was a large spider, which I recognized as belonging to the genus *Tegenaria*. Beneath the web, and in close proximity to the animal above, some running about and others coiled up, I descried numerous woodlice. Spiders, I have observed, will not touch these creatures, no doubt, as hinted by one of your correspondents, on account of their crustacean bodies being too hard for their mandibles to pierce.

I easily secured my prey, and incarcerated it in a box. Some few weeks afterwards, curiosity prompted me to turn over the same stone: another spider, almost as formidable as the last, had taken possession. It was the same species as the one in confinement. To test the voracity of this class of animals, I introduced my new capture on the web of the *other*. In the meantime my pet had been fed with numerous spiders, and not a few choice flies!

I eagerly watched them, for at least half an hour, but they seemed very shy of, and carefully avoided, each other. But behold! when I opened the box, a short time after, my poor pet was tightly clasped in the mandibles of the other, who was greedily imbibing his living juices! Such a size was he (the defunct one), that it took the conqueror nearly two days to feast off his remains. I confined several animals with my new acquaintance; in the first place, I introduced a chilopod;* the spider, no doubt irritated by the other breaking through its web, seized it and held it in its formidable jaws for some time, the other writhing and attempting to pierce the body of its antagonist with its sharp claws, but with no avail. After some time the centipede was dead, but the spider did not attempt to devour the body of so tough an adversary!

The species I think I have identified as *T. atrica*, figured in SCIENCE-GOSSIP,† and is probably, too, that described by your correspondent, Mr. Redgrave.‡ Mr. Robertson, the writer of the article, "More Gossip about Spiders," who gives a figure of it, states, from long observation, "that the Tegenaria almost invariably seize their prey by the upper part of the thorax;" those spiders which I have witnessed, however, as often seize them by the abdomen or side.

My spider has now attained such a degree of tameness that it will even accept a fly from my hand. I have often tried the experiment before friends, but it will never be shown off in that way.

Once I introduced a beetle,* renowned for its hard elytra and the disagreeable quality it possesses of emitting a disgusting odour at pleasure, into my spider's garrison. It immediately rushed at it, but on perceiving the nature of the animal it had to deal with, as rapidly retreated!

I have referred to a popular author† on British spiders, but he does not figure this species: the *T. domestica* figured in his work,‡ and in Carpenter's Zoology, comes near it in affinity. I have not yet had access to Mr. Blackwall's valuable work.

Some few days before I left town I noticed that my spider was collecting some of its web, with the dead flies adhering, and was forming a sort of cocoon on the lid of its box, where it must have laid a number of eggs, for, on my return, upon opening the box, I was astonished to see hundreds of minute spiders running up and down their mother's web. Then mine being a female, I conclude it was the *affectionate* spouse of the other. But the curious part of it is that the male in this case was a great deal larger than the female. Now this is in direct conrtadiction to the observations of learned arachnologists. It can be explained either by assuming that my former prisoner had attained unusual dimensions from being overfed, or that they were both females. I think the former supposition the more probable.

I was under the painful necessity of trying the effects of hot water upon a few of the young, leaving the bereft parent half a dozen.

Shortly after this, the mother died, whether from grief, disease, or natural decay, I dare not say!

I have filled her post with a large and well-known garden spider (*Epeira diadema*), and, strange to say, it lives perfectly at ease on the other's web, and has not made one of its own, nor has it attempted to devour its congener's offspring. In activity it cannot be compared with the latter, nor in appetite, for it seldom indulges in a fly: probably it anticipates hybernation.

Notting Hill. E. HALSE.

"IT was a beautiful hour of the world, the dawn of a day entirely new, when, above the bitter waters, on the first nascent island, in a night calm and serene, was deposited the *first* drop of dew."—"*Nature*," *by Madame Michelet.*

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* *Lithobius forcipatus.* † Vol. iv. p. 82.
‡ See June number of last year.

* *Blaps mortisaga.* † Mr. Staveley.
‡ "A Study of British Spiders."

MICROSCOPY.

Old Change Microscopical Society.—We notice that the sixth annual *soirée* of this flourishing society is to be held on Friday evening, February 28th, at the City Terminus Hotel, Cannon Street. Whilst mentioning the society, we avail ourselves of the opportunity to notice the capital series of lectures which have been arranged for the session of 1872-3. We have only to mention the names of Dr. Carpenter, Professor T. Rymer Jones, Mr. B. T. Lowne, Mr. M. C. Cooke, and Dr. Julius Pollock for our readers to appreciate the intellectual bill of fare.

Structure of Podura Scales.—The *American Naturalist* states that Dr. J. W. S. Arnold has succeeded in throwing off, by means of the electric induction-spark, some of the "spines" of the familiar test-scale of *Podura*. Preparatory to this experiment the scales are rendered brittle by drying in an oven. The detached spines are easily beaded by unilateral light.

Bad Coke and the Microscope.—In a closed iron stove I burn coke, which I think is unusually bad this year, and whilst burning I find a liquid perpetually dripping from the chimney, which, of course, is a great nuisance, as I am obliged to keep a vessel under it to catch it. After very many fruitless attempts I have succeeded in producing from it a very beautiful polariscopic object. With a powerful light and deep-coloured selenite the colours are very rich and brilliant; also without the selenite plate, with the polarizer turned "dark," many of the ramifications appear to stand out in very bold relief, of a fine gold-colour. From causes which I am at present quite unable to determine, this liquid gives a greater diversity of slides than anything I have ever yet met with. I have five or six totally different—indeed, you would scarcely detect a "family likeness" in a dozen. I have a few mounted slides of the above, which, for want of a better name, I call "Distillation from the vapour of coke," and shall be glad to exchange them for anything special.—*Alfred Allen.*

Blood-disks of Salmonidæ.—At a late meeting of the East Kent Natural History Society Mr. Gulliver exhibited the blood-disks of *Salmo fontinalis* and *S. ferox*, and showed that in the former fish these corpuscles—having a mean length of $\frac{1}{1433}$ and a breadth of $\frac{1}{2286}$ of an inch—are the largest yet known of the osseous fishes. In *S. ferox* the corpuscles are but very slightly smaller. Thus these results agree with those described and figured of other species of the family in his memoir read at the Zoological Society November 19, 1872, in which he concludes that the Salmon family is characterized, among the osseous fishes, by the large size of its blood-disks; and hence these may be very easily examined by the novice in this department of micrography.

Local Societies.—We are glad to note the foundation of the New Cross Microscopical and Natural History Society, under the presidency of Mr. Jenner Weir, F.L.S., and the hon. secretaryship of Mr. Martin Burgess. The society meets at the Commercial-rooms, Lewisham High-road, on the third Wednesday of every month, at eight o'clock. Its avowed objects are to enable microscopists and students of natural history residing in the neighbourhood of New Cross, Lewisham, and Deptford, to meet and interchange communications and specimens, to promote the acquisition of skill in the use of the microscope, and, by occasional excursions into the country around, to investigate the natural productions of the district. We cordially wish the new society success.

ZOOLOGY.

Cleaning Feathers and Skins.—In reply to your correspondent "W. R.," owing to my not having got the August number of Science-Gossip, I am unable to determine if it is a recipe for simply cleaning feathers, or the whole skin of a bird, that he requires. If the specimen is simply spotted with blood, allow it to dry, and then take up some of the feathers and lay them on the soft part of your thumb and scratch them in the direction of their length with the nail of the first finger: this will, in most cases (and if no other attempt has been made), remove the blood-spots. Should the skin be dirty from grease or any other cause, or the blood-stains be unable to be taken out by the above means, adopt the following plan:—Take powdered alum, 4 oz.; do. arsenic, 2 oz., mix; in water 1 gallon. Steep the skin for some hours, till the spots grow faint, then have ready a heap of "plaster of Paris," in which the skin must be buried and left till the plaster is dry, and then broken out. The skin should not be allowed to drain too much, but should contain sufficient water to form a good thick cake of the plaster round it. Care should be taken not to take the skin out of the plaster till it is quite dry. I have found this process succeed admirably with duck, grebe, &c., but have not tried it with owls, nightjars, and delicate-feathered birds. I should be glad if "W. R." would report in the Science-Gossip if he finds the plan answer.—*South Australian.*

Do Flies eat Pollen?—A paper bearing on this subject has been read by Mr. A. W. Bennett before the Scientific Committee of the Horticultural Society, in which it was stated, as the result both of his own observations and those of E. Müller

that the microscopical examination of the stomachs of diptera belonging to the order *Syrphidæ* showed them to contain large quantities of pollen-grains, especially of pants belonging to the order *Compositæ*. Entomologists had expressed a doubt as to whether it was possible for insects possessing only a suctorial proboscis to devour such solid bodies as pollen-grains; but Müller believes that the transverse denticulations found in the valves at the end of the proboscis of many of the diptera are especially adapted for chewing pollen, and for dividing the threads by which the grains are often bound together.

Generation of Eels.—On this very interesting and recondite subject we have had very discordant opinions, from the father of Natural History to the present time. Yarrell, with the assistance of Jessie, about twenty or thirty years since, made numberess observations, and concluded that eels produce their young like other bony fishes. Owen supports, or rather reiterates, this view. But in 1848 G. Schluesser, as reported by Van der Hoven (vol. i. p. 39), made researches which tended to prove that male eels are still unknown. Hermaphroditism in fishes was only recognized as an abnormal phenomenon occurring occasionally in a few species, and, according to Dufossé, regularly in *Serranus hepatus*, *S. scriba*, and *S. cabrilla*. Lastly, as reported in the *Journal of Anatomy*, May, 1872, p. 447, an Italian physiologist, G. B. Erolani, asserts the constantly perfect hermaphroditism of the eel. In December the testes and spermatozoa acquire complete development, with well-developed ovaries in the selfsame fish. The ova and spermatozoa are discharged into the peritoneal cavity, so that the ova are fertilized before their escape from the body; and all this only in winter and in salt water. Thus the question affords an interesting and important one for inquiry by naturalists using the microscope at the seaside.—*Q. F.*

The Fresh-water Polyp.—We omitted to state, in Mr. Fullagar's interesting article on this subject last month, that the "Spermatozoa of *Hydra*" (fig. 17) were drawn by Dr. Gulliver, F.R.S., from that gentleman's own observation.

BOTANY.

Herbaria.—A few words respecting the construction of botanical collections would, I think, be generally useful, and especially to beginners, who are often daunted in their endeavours to collect, by the apparent complexity of constructing an herbarium. I think the few following suggestions, if adopted, will be found to succeed. The collector should first procure some flat boxes, of cardboard or thin wood, say 1 in. or 1½ in. in depth, of various sizes, corresponding of course to the kind of plant to be introduced. The plants and flowers are laid out upon sheets of paper; the paper to have slits cut in it to introduce the branches of the plant, or slips may be gummed over, though the former way is, I think, preferable. *Do not gum the plant to the paper*. This is important, as, if gummed, they cannot possibly admit of a thorough and ready examination. The plants should now be named, and grouped together, according to their families and genera. Each genus should be numbered. The boxes should be marked in series, according to the letters of the alphabet, and a certain number of genera must be introduced to each series, say fifty. Thus the first series would be, Genera A, 1—50. The first series of boxes marked A would thus contain fifty genera. And when we have to add more species to any genus, the box of such genus will admit of the introduction of such species; for if the box be already filled, the *topmost* genus has merely to be shifted into the *bottom* of the next box, and thus further them through the whole series of cases; and thus we should always be enabled to add fresh species, and introduce them in their proper place, with very little trouble. The first series of cases, A 1—50, being completed, a list must be now made of them, and they can be stowed away, all the smaller cases to be put into one large one; and another series is commenced, viz. B 1—50; and so on. Upon the paper of each plant should be given the *common name*, besides the scientific name, and some description, as to where found, by whom given, and all other particulars. These notes, be it observed, are of the last importance, because they are essential to the *usefulness* of the Herbarium. The plants may be poisoned with corrosive sublimate, or a little camphor may be put into bags and hung in the cases. But if the cases be kept dry, the flowers and plants will be found to keep admirably as a rule, without any such precaution. Perhaps this short account may not be so clearly understood as I could wish; for it is always difficult to describe that which is to be carried out in practice, and only properly learnt by experience. —*W. S. Palmer.*

Arabis stricta.—Mr. Lees, in his communication to you on "Recent Records of Rare Plants," refers to *Arabis stricta*, and presumes it must be almost, if not quite extinct, as it was not discovered by him here in 1871. I have, for several years, noticed this plant with much interest. There are several spots in this locality where it may be found, either a few scattered specimens or small patches of a dozen or more. In 1872 it was more abundant and luxuriant than I had ever seen it before. Over a space of a square yard or two, in one place, were at least fifty plants, the pale petals being distinguishable at a considerable distance. Very many

were scattered over the inaccessible face of the cliffs, quite safe from the most ardent botanist. Edging the rocks beyond this were many others, and again it occurred not far from the sea-wall. As this little rarity is spread over so wide a space, and its appearance being somewhat insignificant, there seems little danger of its extinction.—*E. Wheeler, Bristol.*

ARABIS STRICTA (S.-G., 1873, p. 2).—This plant is happily not extinct on St. Vincent's Rocks, Bristol. (See *Journal of Botany*, 1872, p. 266; and *Science-Gossip*, 1872, p. 232.)—*James Britten.*

BOTANICAL LABELS.—We have received a series of botanical labels for labelling Herbaria, adapted to the names in the London Catalogue of Plants, and the manuals of Professor Babington and Dr. Hooker, with extra labels for all new species and varieties recorded in the recent volumes of the *Journal of Botany* and the Exchange Club reports. It forms a volume of nearly 300 leaves, clearly printed on one side only. The compiler is Mr. John E. Robson, and the publisher Hardwicke, Piccadilly. We have carefully looked the volume over, and think highly of Mr. Robson's industry. Collectors cannot do better than avail themselves of it, and get into their possession the best-printed labels we have yet seen, arranged in the order which English botanists generally agree to be the best—that of the London Catalogue.

FERTILIZATION OF THE YUCCA PLANT.—The mode of fertilization of this plant has just been discovered by Professor Riley, of St. Louis. It is performed by a small white moth, called *Pronuba Yuccasella*, which forms the type of a new genus. The female only has the basal joint of the maxillary palpus wonderfully modified into a long, prehensile, spined tentacle. With this tentacle she collects the pollen, and thrusts it into the stigmatic tube, and after having thus fertilized the flower she consigns a few eggs to the young fruit, the seeds of which her larvæ feed upon. The *Yucca* is the only insect-loving plant known which absolutely depends for fertilization on a single species of insect, and, as has been shown, that insect seems modified for the purpose. The plant and its fructifier are inseparable under natural conditions, and the latter occurs throughout the native home of the former. In the more northern portions of the United States, and in Europe, where our *Yuccas* have been introduced and are cultivated for their showy blossoms, the insect does not exist, and therefore the *Yuccas* never produce seed in those countries. The larva of the insect eats through the *Yucca* capsule in which it fed, enters the ground, and hybernates there in an oval silken cocoon. In this stage the insect may be sent to this country by mail, and our English botanists may, by introducing it, be able to have the *Yucca* produce seed after its kind.

THE BATTLE OF LIFE AMONG PLANTS.—A capital article on this most important and interesting subject appears in the last number of the *Popular Science Review*, from the pen of Dr. Masters. The examples selected are well-known and common species of plants, such as *Triticum repens*, *Anacharis*, &c. The article is a valuable contribution to the theory of Natural Selection.

SEQUOIA, AND ITS HISTORY.—This was the subject of an address delivered by Professor Asa Gray, President of the American Association for the Advancement of Science, before the recent meeting. It appears in full in the last number of the *Annals and Magazine of Natural History*. The Professor asks whether the *Sequoias* have played in former times, and upon a larger scale, a more imposing part, of which the present is but the epilogue? We cannot, he says, gaze high up the huge and venerable trunks which people cross the continent to behold, without wishing that these patriarchs of the grove were able, like the long-lived ante-diluvians of Scripture, to hand down to us, through a few generations, the traditions of centuries, and so tell us somewhat of the history of their race. Fifteen hundred annual layers have been counted, or satisfactorily made out, upon one or two fallen trunks. It is probable that, close to the heart of some of the *living* trees, may be found the circle that records the year of our Saviour's nativity! A few generations of such trees might carry the history a long way back. But the ground they stand upon, and the marks of very recent geological change and vicissitude in the region around, testify that not very many such generations can have flourished there, at least in an unbroken sequence. When the site was covered by glaciers, these *Sequoias* must have occupied other stations, if, as there is reason to believe, they then existed in the land.

SPHÆRAPHIDES OF SILENE MARITIMA.—A reference to the engravings in SCIENCE-GOSSIP, April 1, 1870 (fig. 92, p. 99), will at once show the remarkable difference between raphides and Sphæraphides. These last crystals abound in many British plants, especially of the orders Caryophyllaceæ, Urticaceæ, Chenopodiaceæ, &c., and may be well examined in *Silene maritima*. In this plant the Sphæraphides are so large as to measure about $\frac{1}{1333}$ of an inch in diameter, and so beautiful as to afford most interesting objects, which may be very easily preserved on a slide, to enrich the cabinet of microscopic phytotomy.—*Q. F.*

SWANS AND FISH.—I should feel obliged if any of your numerous scientific readers can inform me if the swan destroys the spawn of fish, and if they keep down the growth of weeds in rivers and lakes, a question of great importance to those interested in pisciculture.—*F. G. P.*

GEOLOGY.

Geological Maps.—Those of our geological readers who desire instruction in practical geological mapping cannot do better than read an able and well-written article on "How to make a Geological Map," in the *Popular Science Review*, by Mr. H. B. Woodward, F.G.S., of the Geological Survey of England and Wales.

Fossil Wood.—I have cut a few sections of coal that I thought might contain structure, but with the same result as E. T. Scott. If the coal is interspersed with mineral charcoal, as is the case with some, he may expect some little result. Witham, in his "Fossil Vegetables," speaks of the difficulty of finding structure in coal. He says the Bovey coal does not present very decided characters under the microscope, yet the figure of the block from which he cut has a very ligneous look. There are, at times, fragments of fossil wood to be met with in coal with the woody structure very well preserved by the specimen becoming calcified before bitumenization set in. It is said that lignite or brown coal of the Miocene formation shows structure. I am not able to speak to the truth of this, having never cut sections of it. If E. T. Scott will send me his address, I will send him a few fragments of fossil wood from coal that will repay the trouble of preparing for the microscope.—*John Butterworth, Goat's Shaw, nr. Oldham.*

Antiquity of Man in America.—The discoveries that are constantly being made in this country are proving that man existed on this continent as far back in geological time as on the European continent; and it even seems that America, really the *old* world geologically, will prove to be the birthplace of the earliest race of man. One of the latest discoveries is that by Mr. E. L. Berthered, given in full, with a map, in the "Proceedings of the Philadelphia Academy of Sciences for 1872." Mr. Berthered there reports the discovery of ancient fireplaces, rude stone monuments, and implements of stone in great number and variety, in several places along Crow Creek in Colorado, and also in several other rivers in the neighbourhood. These fireplaces indicate several ancient sites of an unknown race, differing entirely from the mound-builders and the present Indians, while the shells and other fossils found with the remains make it appear certain that the deposit in which the ancient sites are found is as old as the Pliocene and, perhaps, as the Miocene periods. As the fossil shells found with the remains of man are estuarine forms, and as the sites of the ancient towns are on extended points of land and at the bases of ridges or bluffs, Mr. Berthered thinks the localities have been near some ancient fresh-water lake.

A "Missing Link."—Professor Marsh has communicated a short note to the *Annals and Magazine of Natural History* for January, on what he appropriately terms "one of the most interesting of recent discoveries in Palæontology." It is the skeleton of a fossil bird, recently found in the cretaceous shales of Kansas. The remains indicate an *aquatic* bird, as large as a pigeon, and differing widely from all known birds in having *biconcave vertebræ!* The cervical, dorsal, and caudal vertebræ preserved, all show this character, the ends of the centra resembling those of the fossil marine reptile called *Plesiosaurus*. The rest of the skeleton presents no marked deviation from the ordinary type of birds. The wings were large in proportion to the posterior extremities. The humerus was 58·6 millimètres in length, and has the radial crest strongly developed. The femur is small, and has the proximal end compressed transversely. The tibia is slender, and 44·5 millimètres long; its distal end is incurved as in swimming birds, but has no supratendinal ridge. Professor Marsh proposes to name this singular creature *Ichthyornis dispar*.

NOTES AND QUERIES.

The Compass-flower.—I beg to inform James Pearson that the Compass-flower does not owe its existence to the imagination of the poet's brain. The botanical name of this remarkable flower is *Silphium laciniatum*, of which there are several known varieties; but one only—*S. laciniatum*—appears to possess the peculiar property assigned to it by the poet. From the statements of numerous observers who have examined the plant, it appears that it does undoubtedly possess this peculiarity, which fact is well known to the hunters and settlers who frequent the vast prairies whereon it grows. It proves of great service to them when overtaken by night on those trackless wastes which abound in North America, far from any town or habitation of man, and with no other resource but this one simple, yet wonderful, flower of the desert to direct them with safety to their destination. The cause assigned for this so-called polarity by Dr. Gray is, that the two surfaces of the leaf are equally susceptible to light. Examined microscopically, it was found that the upper and under surface proper were identical in structure, with exactly the same number of *stomata* on each surface, while the number of *stomata* on allied species varied considerably. The result of these observations showed that the meridional position taken by the leaves of this plant was due to the influence light exerted on the two surfaces, and that the greatest amount of light attained in northern latitudes, equally distributed on the two surfaces, would be that position in which the leaves are presented, north and south.—*Henry Blake.*

The "Compass-flower."—If Mr. Pearson, who asks (in S.-G., Dec., p. 281) if there is such a plant as the "Compass-flower," will turn to the *American Naturalist*, vol. v. p. 1, he will find quite a full account of the polarity of the Compass-plant and the supposed causes of it, by Mr. Whitney, and also a little critique on Mr. Longfellow's description of the plant.—*F. W. Putnam, Peabody Academy of Sciences, Salem, Mass.*

The Compass-plant.—In your journal for December I notice an inquiry from a correspondent respecting the Compass-flower, mentioned by Longfellow in his poem "Evangeline." There is a plant in the western United States (Ohio to Kansas) which is known as the Compass-plant, which is probably the plant Longfellow intended to describe; but he seems to have strangely misapprehended its character. The Compass-plant to which I refer is the *Silphium laciniatum*, a rank, coarse plant of the nat. ord. Compositæ, L. There are a number of large, erect, stiff, pinnately-parted leaves, one to two feet long, at the base of the stalk, which rises six to eight feet high, coarse and rough, with smaller leaves, without branches, and with six to twelve large yellow flowers in a raceme-like spike at the top. The stem is often covered with drops of rosin, on which account it is also called Rosin-weed. It is generally conceded that the leaves have a tendency to point north and south. The cause assigned for this polarity by Dr. Gray is that both sides of the leaf are equally provided with *stomata*, and are consequently equally sensitive to the light, the position which they assume being the one which gives both surfaces an equal exposure to the rays of the sun.—*Geo. Vasey, Department of Agriculture, Washington, U.S.*

Bees and Plants.—A short time ago I was watching a humble bee (*Bombus terrestris*) collecting from the blossoms of a snapdragon, in which operation it became liberally coated with the pollen. When it set to work to clean itself, the forelegs were passed repeatedly over the thorax; but, as they were considerably too short to meet in this position, a broad central stripe of pollen remained untouched on the thorax, when the insect, apparently satisfied with its toilet, resumed its foraging occupation. This inability of the bee to cleanse itself entirely from the adhering grains of pollen must greatly assist its agency in the fertilization of plants.—*George Guyon.*

Tussilago Petastites is described by Steele and Withering as flowering in April; and as a rule this is so. This year, however, owing, probably, to the mildness of the weather and unusual quantity of rain, I found it in full flower, and *leaf also*, at the foot of Clifton Rocks, on the 1st day of January. Withering states that the flowers appear before the leaves, which is, generally speaking, true; but in this instance they were as abundant as the flowers themselves, and of luxuriant growth. Neither of the authors mentioned says anything about the perfume of the flowers, which is exceedingly powerful, and pleasant withal.—*S. Smith, M.R.C.S.E., &c.*

Beech-trees and Lightning.—Having only just subscribed to Science-Gossip, my evidence on lightning-struck beech-trees comes rather late. I confess I was somewhat surprised by seeing it stated that beech-trees are free from the effects of lightning. I am not in a position to state how many beeches I have seen that have been struck, as I have not thought it worth while to record instances of what seemed to me common occurrences. Last October one was pointed out to me at Froxfield, near Petersfield, Hants, that had been struck about a week previously. It was a fine, tall, straight tree, but not so tall as various other trees surrounding it. The trunk was split in two from a foot near the top to the roots.—*A. C. Hervey.*

Fern Spores.—Can any of your correspondents inform me whether the spores of greenhouse ferns, which I unsuccessfully endeavoured to raise last year (I think through insufficient heat), would be likely to germinate if properly treated next summer, or would the fact of their having become quite dry since then prevent the operation being successful?—*C. H. G.*

Stings of the Queen Bee and Worker Bee.—Major Munn, at the meeting of the East Kent Natural History Society, January 2nd, 1873, communicated a paper, illustrated by preparations and drawings, to prove that the queen bee cannot use her sting to penetrate the offending part like the worker bee, and that she employs it offensively only to inject the poison into the spiracles of an antagonist queen. This conclusion he adopts from many experiments and observations on the combats between rival queens. And having had the stings examined by Mr. G. Gulliver, of Pembroke College, Oxford, it appears that the sting of the queen has three or four blunt barbs, and is curved, larger, and blunter at the point than the sting of the worker, and that this last sting is quite straight, very sharp at the end, and possessed of from eight to ten very sharp barbs. If Major Munn's conclusion should be confirmed, it will be important to practical bee-masters and experimental physiologists, since the queen bee may be handled, even by the most delicate fingers, with perfect impunity.

Recent Rains and Aquatic Insects.—Some entomologists congratulate themselves that water-insects will be plentiful, though butterflies and moths may be scarce, throughout the year 1873. I have myself observed near London that there has been a scarcity of water-insects for some years past, as compared with the years preceding: this is due to several rather dry seasons we have had since 1868, which caused many ponds to dry up, and greatly lessened others. It must be acknowledged that the recent ample rains have made us amends in this respect, especially as viewed in conjunction with the mild temperature, so favourable to the increase and more rapid development of insect life. On our commons new ponds are formed in various places, and these soon begin to teem with insects, and aquatic plants spring up in them. Ditches, too, which have had the character of being dry for a dozen years or more, are in many places running like rivulets, and producing animals and plants which prefer running water; so that, altogether, there should be a good season for those who amuse themselves with fresh-water aqua-vivaria. Certainly, at present, the hunt for specimens has to be carried on under difficulties, since some ponds have so extended themselves as to be hardly approachable, unless the explorer is stilted; and unless the deeper water is reached, as a general rule, few insects will be taken. They seem to be in some way aware that when a pond has overflowed its bounds the few inches' depth of water beyond is no safe home for them, as a change of weather will reduce it to the usual limits. Also in shallow water insects are more exposed to enemies, aquatic and non-aquatic. The preferences shown by some species are singular and not easily explicable. One pond will be found to yield larvæ of the common gnat in abundance, while none occur in adjacent ponds. The larvæ of the various caddis-flies (*Phryganidæ*) evidently dislike water which is quite stagnant. The more weedy and muddy a pond is, the greater attraction does it present to most dragon-flies.—*J. R. S. C.*

Books on Insect Anatomy (p. 20).—The following amongst others, may be recommended to "J. S. H." if he can obtain them, *good* works on the subject being mostly scarce:—"Swammerdam's History of Insects," English edition, with Dr. Hill's notes, published about a century ago, and worth, second-hand, about a guinea. "Wilson's Treatise on Insects, General and Systematic," with 540 figures, published at 15s., contains, I believe, some anatomical details. "Ormerod's British Social Wasps, their Anatomy and Physiology," is good on that section of insects. "Adams on the Microscope" contains much information on insect anatomy: it is not, however, a modern book. "Professor Owen's Anatomy and Physiology" is excellent but expensive, since the portion treating of insects cannot be purchased separately; and the same remark must be made upon "Professor Rymer Jones's Outline of the Organization of the Animal Kingdom." Much information upon the anatomy of various groups is to be found in the works of Latreille, Halliday, Westwood, Macleay, Newport, and Lowne.—*J. R. S. C.*

Oak Spangles.—After many microscopical investigations I find myself quite unable to understand "Oak-leaf spangles," either as regards their connection with the leaf, or the difference in structure observable between them and the leaf. The article in Science-Gossip for October, 1866, does not explain this. Can you kindly tell me how I can get the information I want? The difference in structure is most marked in presence of the curious tufts of *hairs* (?) on their surface; and their connection with the cuticle is so slight at one point only, that one can hardly understand their being formed by a modification of its cells.—*Arthur R. Graham.*

A White Sparrow.—I have, on many occasions during the last twelve months, observed a house sparrow (*Passer domesticus*), whose plumage is very nearly entirely white, in the neighbourhood of my residence It is frequently seen in the company of other sparrows, and with them drinks at a fountain which is situated at the extreme end of the garden adjoining the house. The bird has a few feathers in each wing which are, towards the tips, of a greyish colour, and there are also indications of similar feathers in the neck. The rest of the plumage appears to be quite white, and was formerly much more so, previously to the first moulting, than at present. It is a last year's bird, a fact which I determined by looking at it particularly through a telescope and observing the bill, &c. There is no question as to its being a sparrow, for very many reasons. Its manner of flight is precisely the same, and its size, bill, &c., are analogous to those of these common birds. I believe that a "white sparrow" is a great rarity, and therefore write to apprise you of the existence of one in this neighborhood. It may be interesting to relate, also, that a short time ago I saw a rook (*Corvus frugilegus*) which displayed several white feathers in his wings. This fact rests on the authority of many observers, as also does that of the white sparrow.—*William F. Denning, Bristol.*

The Harvest Bug.—My experience of this troublesome little creature differs widely from that of Mr. Cape. A hot summer is a great misery to me, as these creatures are all over the farm, but are especially troublesome on my croquet lawn, which is situate on a raised terrace of sandy soil. In wet weather they seem to be washed away, and to be killed by cold. Hence, whatever other pains the wet summers of 1871 and 1872 have brought the farmers, the cold rains of these summers have greatly lessened the harvest bugs. The elevations of the skin caused by these creatures are commonly called *heat-bumps*, and many a nauseous dose had I to take in my youth on the supposition that these bumps were due to heat of blood. We have tried lots of remedies for the irritation, but find none so good as not rubbing, if one can have the patience to keep therefrom.—*J. Buckman.*

Are Beech-trees exempt from Injury by Lightning?—In relation to the above, the following is an extract from a letter in the *English Mechanic*, 6th Sept., 1872, p. 650:—"Lightning and Thunder—Without having seen a large tree the day after its destruction, one can hardly form an idea of the tremendous force exhibited. I had such a view of a beech-tree, that was probably one of the largest in England, and may be remembered as standing before the elder chalk-pit west of Caversham, Oxon. The trunk, about six feet in diameter and perfectly sound to the heart, had been cleft, and, except the lowest yard or two, had fallen with the limbs in all directions, with most of its wood in minutely separated fibres like over-stewed meat, and seeming fit to go into a paper-mill, and with very little more pounding form pulp. The fibres were also bleached whiter than parts that had been out of the lightning's track.—*E. L. G.*" Perhaps some of your correspondents could inform us the usual appearances of trees after being struck by lightning, and the position in which such trees stood.—*J. D. Miall.*

Stratiotes.—Can any of the readers of the Science-Gossip inform me if *Stratiotes aloides*, the "Water Soldier," is still found in the ponds of Wandsworth Common, as I have not been able to discover it there?—*J. G., Clapham Road.*

Erythræa Centaurium (Common Centaury).—We have gathered examples with brilliant white flowers, which, if they come true from seed, would make an interesting garden plant. It occurred on the oolite sands, and is so thoroughly white that, if a mere sport due to season, it is a remarkable one.—*J. B., Bradford Abbas.*

Rural Natural History.—On reading the rural recipe named for "chink cough," and the remark that, to "record others might be amusing," I venture to name some that were recommended to me when living at Tonbridge, where I was a sufferer from ague, and as a district visitor (young and sympathizing) was beloved; so the poor people often, when asking how I was, would suggest each their kind but "certain cure." "Now do, dear miss, be sure and cut your nails of a Wednesday;" and again—"live spiders rubbed up in butter and eaten," was first-rate; also—"tie with some worsted an onion round the neck." In Essex, where I afterwards went, the ague is very prevalent. Curious to say, there I never had it, so conclude miasma from the Medway gave it me, not damp; and in Bayswater I have it, the drainage being bad. The children in Sunday school used merely to say, "only the ager, ma'am," and they thought pitch pills would cure it. In Guernsey, the poor people make their mattress of *Vriac* seaweed, and pile it in their cottages as fuel, and consider it healthy; and I believe it is so, as it is that from which iodine is abstracted. In France, an old woman told me to take a small piece of hair exactly at the top of my head and twist round a little slip of wood tightly, to cure a relaxed uvula, or sore

throat, and to twist till I heard "click," which would draw it up! In Kent, the idea prevails also, a great and sudden fright will cure ague; an old woman telling me that when young, and suffering from ague, she was sitting by a little stream, a passer-by in fun gave her a push, and she was precipitated into the water and very much frightened, "but it quite cured the ague."

Collection Catalogue.—I find the following an easy plan as applied to English Botany; I think, moreover, it has the merit of simplicity. I procure an ordinary account-book, ruled, however, with the faint blue transverse lines only; the size as to length or breadth is immaterial, although it is better to have one tolerably large, say 9 inches by 6: the thickness should be in proportion to the amount of notes the collector intends to make. I now take my text-book (Hooker and Arnott's), and I find under the first order *Ranunculaceæ*, the first genus *Clematis*, containing one species only; accordingly I head my book with the name of the order in bold writing, and the genus I write on the extreme left margin, leaving the line to be filled in when I get the plant. The next genus, *Thalictrum*, contains three species; consequently, I leave three lines, writing the genus on the edge as before, and connecting the lines with a bracket. In this manner I go right through my Flora, and have created a sort of skeleton list to be filled up as I collect the plant. Whenever I have found and named any ordinary specimen, say *Cardamine pratensis*, I refer to the order and genus, and write in the species, and carry the habitat, &c., on to the opposite page. In the event of a rarity or any peculiarity deserving especial notice, I write an account of it at the end of the list (which should occupy about half the thickness of the book), and against the entry of the plant in its proper place, I write the page on which this further account may be found. I may add that, the list being arranged in precisely the same order as the book, it is wonderfully easy after a time to turn to any order and plant at once; and of course, as long as any English plant remains to collect, so long is the list serviceable.—*G. T. N.*

Variety of Convolvulus Sepium.—On driving along the road between Yeovil and Montacute, in passing through the village of Preston we were struck by the profusion of large bright white convolvulus flowers, intermixed with which were larger flowers of a beautiful pink hue. On examining these latter more attentively, we found that the flowers were as much as nine inches in circumference, their interior being ornamented by five bands or folds of the purest white. These very conspicuous flowers were both in colour and ornamentation like some of the brighter examples of *C. arvensis* upon a gigantic scale, and were so pleasing and attractive as to be not unworthy of cultivation.—*J. B.*

On the Sleep of Plants.—Your correspondent W. J. W. White may rest assured that plants do go to sleep, and that the light of gas alone, provided there were not any deleterious properties in it, would, in time, kill them. Experiments have been tried, and prove this: plants kept in a dark cellar and exposed for a time both day and night to the light of a lamp, retain a portion of their green colouring matter, but die eventually of weakness, caused by the lack of rest. Light separates the moisture in plants into hydrogen and oxygen, and disengages the oxygen from the carbonic acid; but vegetable chemists cannot go on working for ever at the same thing; they want darkness to give out carbon and absorb oxygen in; so I repeat it, *plants would die from exposure to continual light*, though Mr. White is of opinion that my "notion" is "a most mistaken one."—*Helen E. Watney.*

Parasites on House Fly.—In March last, whilst examining under the microscope a specimen of the common fly (*Musca domestica*), I found a number of parasites: can any one give me an idea where I may find a description of the same?—*G. Bennett.*

Stings of Wasps.—"R. H. N. B." is right about a tube running down the blade of the sting; but is that for economy and strength, like a quill, or to convey the poison? I cannot get any wasps now; but in a sting I have by me the tube goes nearly to the point of the sting, and from it six projections, like small tubes, extend, not to the points of the barbs, but just halfway between two points. They certainly look as if they had an opening, but I should like to know more about this; if they *are* open, and come from the poison-bag, a good hand ought to be able to squeeze out some of the poison from a fresh sting. This would be proof positive as to the use of the tube.—*E. T. Scott.*

Self-heal.—The Self-heal, or its synonyms Carpenters' Herb, Sickle-wort, and Hook-weed, allude to its uses as a vulnerary. Old herbalists record many cases of wounds inflicted by sickles, scythes, &c., being healed by its use. On account of its astringent nature, it was probably useful in such cases. Its original name, *Brunella*, said to be derived from the German *Bräune*, the quinsy (from its supposed use in that complaint), was altered by Linnæus to its modern one of *Prunella*. —*W. L. Sarjeant.*

Sugaring for Noctuæ.—Any sweet compound, which is somewhat odorous also, will bring some of the night-flying moths. Treacle and honey in solution have been tried, but the best preparation decidedly is that compounded of the strong, dark-coloured sugar, commonly known as "foots," which must be dissolved in boiling water (it is hardly necessary to boil the solution), and then, at the time of using, a small quantity of rum is added to the syrup, about in the proportion of a tablespoonful to a pint. Some entomologists use other flavours, as, for instance, the essential oils of aniseed and bitter almonds, but I have not found these of advantage. This compound can be spread on tree-trunks and palings: it is usual to distribute it in streaks rather than in patches, and at about four feet above the ground. It is quite possible that were it spread at a greater height—say seven or eight feet from the ground,—it would exert a greater attractive power, yet it would be difficult under these circumstances for the collector to make his captures in the dusk of evening, even with the aid of a lantern. This latter is an important accessory; but the bull's-eye lantern is apt to confuse both the moths and the moth-hunter. Besides *Noctuæ*, other moths will occasionally visit the sugar, *Pyrales* pretty frequently, and *Geometræ* now and then; and I have found larvæ upon it, not seemingly by accident; as, for instance, that of *Arctia lubricipeda*. I have noticed repeatedly what has been pointed out by the Rev. Joseph Greene, viz., that there is mostly an interval about ten—sometimes earlier, sometimes later,—when moths, if they do not cease to fly, will not approach the sugar.—*J. R. S. C.*

MOTHS UNDER WATER.—A curious incident occurred to me some weeks ago while sugaring with a friend at Catford. We were sitting together on the banks of a stream, and pinning out our captures, which consisted of several *C. nupta* and *M. maura*, when the box, which was a heavy metal one, slipped from our knees and fell with all its contents to the bottom of the river. Luckily it was open, and with a hooked stick we managed to get it up again, after one or two minutes. Of course, the box was soaked, but, strange to say, the insects were scarcely damp, and the scales of the wings were quite uninjured. Considering their rapid passage through the water of a running stream, and their consequent sojourn at the bottom, I think this was rather curious.—*E. C. Lefroy.*

REARING YOUNG DORMICE.—I have failed three times in my attempts to bring up broods of dormice. On looking into the nest, I always found that the mother had destroyed one of her young, and she killed the rest soon after. She was fed during ten days before examining the nest, so it could not have been hunger that made her do this, and I always carefully avoid disturbing her. If any of your readers who have had practical experience in the matter would give me some hints on the rearing of these little creatures, I should feel extremely obliged.—*W. K. Curling.*

CATOCALA FRAXINI.—In answer to the query of Mr. Pickin (p. 283, last vol.), it is not difficult to account for the occasional appearance here of this insect by the "blown-over" theory, considering its expanse and strength of wing. Few years pass without records of individual captures in this country. It has been taken in Shropshire before, but in what part of the county I do not know. I have never heard of the larva having been found in England.—*E. S. Kemp Welch.*

PRESERVATION OF LARVÆ.—I would supplement Mr. Auld's practical and excellent notes by adding that it is well, as I am informed, that when a larva is selected for operating upon which has only recently cast its skin (in order that the colours may have due freshness), a sufficient time after the change must be allowed for the skin and hairs, if any, to become properly dry ere the insect is killed. Also it is advisable in all cases to keep the larva without food for a short space, so as to have no fæcal deposit in the interior. To some experimenters the process of evisceration which has to be carried out is particularly unpleasant; and I have a recollection some years since of reading a description of a plan supposed to obviate this. I do not remember the exact details, but the finishing off was baking, as in Mr. Auld's method, only preceding that was, as I think, a soaking or maceration in a solution. Perhaps amongst the readers of SCIENCE-GOSSIP there may be some who have tried this or any other plan to avoid opening the body, and can inform us as to whether it is at all feasible. As far back as 1857 I was shown by a Mr. Ferguson, of Battersea, a number of different insects preserved in glycerine, and among them some larvæ. They were suspended by the hind pair of claspers, and though the colours and markings were preserved, they necessarily presented rather an unnatural aspect.—*J. R. S. C.*

APPEARANCE OF MALE APHIDES.—Amongst the other effects of the cold weather at the early part of the last summer was the appearance of the winged males of several species of Aphis. These, as is well known, usually emerge in autumn, when pairing takes place, and eggs are deposited, which produce the next year's brood. This anticipation of autumn I noticed in the common plane-tree more particularly, but it occurred also on other plants. I presume, however, that these summer males are the parents of aphid larvæ, not eggs, or perhaps barren.—*J. R. S. C.*

LUMINOUS RHIZOPODA.—I have noticed on the Welsh coast the singular phosphorescence mentioned by "A. B. C.," Croydon. I saw it last spring on a small slip of sand about two miles from Beaumaris, and I have been told that it proceeded from a very minute animal, the *Noctiluca miliaris*. A lady on a visit to me at the time, told me that her father (Major Bernard) had, both in Ireland and on the Continent, found this rhizopod in wet sand. I conclude it is the cause of the luminosity of the sea on our coast, just as the *Pyrosoma Atlantica* is in tropical regions.—*Mrs. Alfred Watney.*

REEDS AND ORGANS.—How few of us are there who, as we pass along the reed-grown banks, or gaze at the shallows of mere or stream, recall the fact that a musical instrument, which, from its sacred and secular uses, may claim to rank the highest, traces its origin to a lowly reed! Yet so it is. The Pan pipe, the history of which goes back to the earliest ages, was just hollow reeds rudely fastened together. These pipes were of differing lengths, and closed at the bottom. Thus we have the mouth-organ in its primitive form, which the myths fabled to be the work of Pan, and in a competition with Apollo, the former bore off the palm. It seems a long distance from this rude instrument to the large and elaborate organ of modern times, yet most of the intermediate stages are traceable.—*J. R. S. C.*

A PLAGUE OF FLIES.—It being now summer, flies swarmed in fearful numbers in the abodes of the Boers. On entering the house, I found the walls of the large sitting-room black with these disgusting insects. They are a cruel plague to the settlers in Southern Africa, and it often requires considerable ingenuity to eat one's dinner or drink a cup of coffee without swallowing some of them.—*Gordon Cumming,* "*The Lion Hunter in South Africa.*"

HONEY-DEW.—The summer of 1825, especially in June and July, was peculiarly hot and dry. The quantity of that sweet clammy fluid which we find upon certain leaves, and commonly called honey-dew, was more than usually abundant during these months. In the daytime bees, wasps, and tribes of flies collected to feed upon it, and in the evenings moths and insects of the night frequented the fruit-trees on our walls, particularly the cherry and the plum, for the same purpose. Aphides abounded upon all the young sprays.—*Knapp,* "*Journal of a Naturalist.*"

COMMUNICATIONS RECEIVED FROM—C. S. S.—E. B.—J. J. M.—J. P.—F. C.—G. H. H.—G. J. L. L.—R. H.—J. R. W.—S. S.—H. E. W.—S. O.—W. F.—A. H.—W. G. F.—A. A. —F. M. W.—G. V.—E. W.—J. T.—E. H. G.—A. C. H.—J. R. D.—T. B. B.—E. C. M.—T. V. C.—W. N.—J. A.—E. R. F. —T. S., Jun.—T. W. F.—R. W. W.—E. E. M.—F. K.—C. G. B.—W. S. K.—W. C.—C. C. A.—E. L.—K. B., Jun.—J. M. D. A.—G. R.—E. L.—H. M. C. A.—W. W.—C. M.—J. P. H. B.—J. H.—J. T.—J. C.—J. B.—T. B. W.—H. O. S.—J. H. C. —G. S. S.—C. J. R.—E. L.—F. W. G.—C. S. S.—J. B.—J. D. M.—J. G.—R. H.—W. S. P.—F. W. P.—J. H. W.—F. F.—H. H. C.—G. D. B.—A. F. B.—Dr. H. G.—J. P.—A. D.—J. R. D.—H. B.—G. G.—J. B.—E. H.—C. H. G.—J. A., Jun.—J. C. H.—G. C.—J. S.—F. W.—J. H.—C. L. J.—E. L. &c.

NOTICES TO CORRESPONDENTS.

W. N.—The East London Naturalists' Club, 23, Fairfoot Road, Bow, is likely to suit you. We are but few in number at present, but I do not know of any club of the sort nearer than this. The Secretary, Mr. J. W. Love, at 23, Fairfoot Road, will furnish further particulars.—J. R. D.

MICRO.—Get the work on "Collecting and Mounting Algæ," from Hardwicke, 192, Piccadilly. It will give you exhaustive information on all you require.

E. E. MATTHEWS.—There is no royal road to the study of Botany. You had better get Dr. Master's little work on Botany, or Professor Balfour's, both cheap and just published. A gardener would not be able to give you much help. Coleman's "Trees and Hedges" would assist you in associating your feeding insects with leaves.

J. H. E.—There is no Entomological Dictionary published. Shuckard's translation of Burmeister's Manual of Entomology contains definitions of great numbers of entomological terms, but it was published long before the work of which you speak. The most useful book for your purpose would be Stainton's "Manual of British Butterflies and Moths," which contains a glossary of its scientific terms.—C. G. B.

E. C. MORELL.—Your question is a difficult one to answer. Damp and old woodwork are probably the cause of the appearance of the *Lepismæ* in such numbers. Benzine and camphor would probably keep them off your books, but the smell may be objectionable. You had better seek for and destroy the home of the insects.

R. H. N. BROWN.—Our correspondent will find full particulars of the new voltaic batteries in a lecture delivered Dec. 11, before the Society of Arts, and published in full in the *Pharmaceutical Journal*, Dec. 28 (Churchill). The lecture was delivered by the author of the paper at Brighton, the Rev. H. Highton, M.A.

E. B.—The white-flowered Centaury is not uncommon. It is merely a variety of the common form.

J. P.—The moss is *Dicranum bryoides*.

T. G.—Your specimen is not a lichen. It is difficult to tell what it is. We have shown it to several good authorities, but none of them can make it out.

E. C. J.—Your zoophytes are as follows:—No. 1, *Serialaria lendigera*, damaged specimen, the secondary polyp-cells almost entirely worn away. No. 2, *Bugula avicularia*, variety, developing in some parts a multiserial arrangement of the polyp-cells.—W. S. K.

W. Z.—The following are the names of the Hepaticæ sent to us:—1. *Metzgeria furcata*; 2. *Jungermannia crenulata*; 3. *Lophocolea bidentata*; 4. *Calypogeia trichomanes*; 5. *Jung. inflata*; 6. *Jung. ventricosa*, v. *gemmifera*.—B. C.

F. FLETCHER.—The incrustations on your piece of coal were not fungoid or lichen growths, but minute radiated crystals of *Witherite*. Examine them with a low power.

A. D.—Our space forbids us, as a rule, answering other than natural history questions. You will find full instructions, if we remember right, how to construct a Sundial, in Lardner's "Museum of Science and Art."

M. J. G.—Mosses:—1. *Hypnum cupressiforme*; 2. and 3. *H. sylvaticum*; 4. *H. molluscum*; 5. *H. filicinum* with *Trichostomum rubellum*; 6. *Scapania undulata*.—R. B.

J. S.—We are much pleased with your slide. The section is beautifully cut, and the carmine staining exquisite.

W. N. will accept our thanks for sending us a capitally executed pen-and-ink sketch of the common double poppy, in which the seeds have been retained and, perhaps owing to the continued warmth and wet, have sprouted. The effect is very singular and pretty, the seed-vessels proper appearing like vases, in which minute plants are growing. Our kind correspondents must pardon us for not inserting the great number of instances, which have been sent us, illustrative of the mildness of the season. They would fill the present number at least.

R. W. W.—The vertebra is that of the Blue Ray (*Raia batis*).

A COUNTRY SUBSCRIBER wishes to know where he can obtain a set of diagrams for a lecture on the Microscope. Will some of our readers kindly help him to the information?

DR. J. P. H. B.—Your sketch of the conifer called "Jerusalem Candlestick-tree" is scarcely enough for identification. You had better send us a leaf or two. It is, however, most probably *Podocarpus coriaceus*, Richard.—W. C.

J. M. D. ASHBURY.—Your mounted specimen of the skin of the Smooth Newt was not sent in a sufficiently strong case. It arrived utterly smashed!

CORRESPONDENCE.—We must request the patient forbearance of many correspondents whose communications have not yet appeared, as we receive so many that we cannot publish half.

S. TAGG, BRYUM, P. BAILEY, &c.—Answers in hand.

BIRDS' EGGS.—Will the correspondent who sent us birds' eggs to name send his address? It has been mislaid.

M. TURNER.—Your fern is *Adiantum hispidum*.—J. B.

S. O.—If the blotches on your pupa are *external*, and can be rubbed off, they are merely caused by some moth which has emerged in the same cage. These would not injure your pupa, unless they hindered the bursting of its shell by binding the sutures together. But if the blotches are *internal*—actual changes of colour, they probably indicate that the pupa is dead. There is no need for wetting pupæ kept in moss.—C. G. B.

JOSEPH ANDERSON.—Wilkinson's "British Tortrices" contains illustrations of twenty-four species and descriptions of all those known at the time of publication; Stainton's "Manual of British Moths," upwards of thirty illustrations, besides the descriptions. These works are both published by Van Voorst, 1, Paternoster Row. There is no other British work answering to your description.—C. G. B.

EXCHANGES.

Pleurosigma angulatum, Test object, well mounted, given for mounted (good) Diatoms.—J. H. Wollaston, Wells, Somerset.

Eggs of Shore Lark, Black Grouse, Dusky Grebe, Bittern, Spoonbill, and many others. List sent on application. Wanted English Moths and Butterflies.—A. F. Buxton, Easneye, Ware.

SEND stamped and addressed envelope with an object of microscopic interest for seeds of *Lilium giganteum*, showing cells of epidermis, transparent object, unmounted, to Geo. D. B., Hurley Villa, Ealing, W.

BRITISH LEPIDOPTERA, also Middle Eocene Fossils, to exchange for British Fossils or Foreign Shells.—E. H. Goddard, Hilmarton, Calne, Wilts.

L. dispar, Eggs of, and other Lepidoptera, for Eggs and Imago of others.—John Purdue, Ridgeway, Plympton, Devon.

NORTH AMERICAN BIRDS' EGGS.—Duplicates of eggs of two hundred species of North American birds, many very rare, to exchange for British Eggs. Owing to difficulty and expense of transatlantic exchanges, I would prefer to exchange with some one possessing an extensive British collection.—W. G. Freedley, 210, South 24th Street, Philadelphia, Pa., U.S.

FOSSILS from the Pliocene Drift for other fossils.—W. Freeman, 165, Maxey Road, Plumstead.

FOR longitudinal and transverse Sections of Horn of Rhinoceros, send stamped envelope and objects of interest to J. R. Williams, Norman's Place, Altrincham.

SOME beautiful specimens of Ores for Geologists, in exchange for Kirby & Spence's Entomology, 7th ed., or back vols. of *Science-Gossip* before 1872.—E. E. Matthews, 48, Leonard Street, Finsbury, E.C.

E. fulvago, *O. dilatata*, *C. vaccinii*, &c., to exchange for other Lepidoptera.—John Harrison, 7, Victoria Bridge, Barnsley.

COCOON of Larva of Figure 8 moth (*Diloba ceruleocephala*), well mounted in balsam for polariscope. Send equally good slide to E. Lovett, Holly Mount, Croydon.

FUNGI.—*Coleosporium pingue* and *Melampsora populina*, mounted, also Petal of *Correa cardinalis*, showing stellate hairs, and *Funaria hygrometrica*,—for good sections of Coal, Teeth, or other good objects.—John Carpenter, Waltham Cross, Herts.

GOOD slides offered for Foraminiferous Deposits, Deep-sea Soundings, or pieces of Foreign Chalk, localities named.—S. C. L. Jackson, 255, Lord Street, Southport.

FOR Skin of Sole or Eel mounted for Polariscope, send well-mounted slides to Thos. Shipton, Jun., 12, High Street, Chesterfield.

BRITISH LEPIDOPTERA and Shells, also a few Fossils and Minerals, for foreign or rare British Shells or Fossils. Lists required and given.—M. M., Post-office, Faversham, Kent.

DIATOMS.—*Cymbella*, *Cocconema*, *Denticula*, *Epithemia*, &c. mounted, for other good mounted objects.—John C. Hutcheson, 8, Lansdowne Crescent, Glasgow.

BOOKS RECEIVED.

"Faith and Free Thought," a second course of Lectures delivered by the Christian Evidence Society. London: Hodder & Stoughton.

"American Naturalist," December, 1872.

"Monthly Microscopical Journal," January, 1873.

"Les Mondes."

"Art Studies from Nature," as applied to Design, by several authors. London: Virtue & Co.

"Manual of Palæontology," by Professor Nicholson. London: W. Blackwood & Sons.

"The Botanist's Pocket-book," by W. R. Hayward. London: Bell & Daldy.

"A series of Botanical Labels for Herbaria," by John E. Robson. London: R. Hardwicke, 192, Piccadilly.

THE COBRA, AND HOW I KILLED IT.

THERE are few men who have not some hobby peculiar to themselves: some ride the high horse, and seek rule over their fellow-mortals; others are content with humbler occupation, and some will combine both. There are eccentric hobbies, useful hobbies, and useless ditto ditto. One of mine, perhaps useless in some people's eyes, but always interesting in my own, has been, ever since I can remember, a mania for collecting insects and stuffing birds, beasts, and reptiles; only as an amateur would do them, but still well enough to please myself.

Sometimes I have found a difficulty in killing some of the larger kinds of reptiles without injuring their outward appearance. Chloroform would always kill butterflies and insects very quickly, without any apparent pain, but on some species it had no effect whatever.

Once I poured a quantity of it down the throat of a young alligator about a yard long, which I got on the banks of the Hooghly, without having the desired result, and I could only kill him by taking a pair of large scissors and cutting the spinal marrow at the base of the head, from inside the throat. This looks like a cruel operation, but the creature was dead instantly.

About the same time, with others, I had an opportunity of obtaining from a native a fine *Cobra-di capello.* It was a handsome brute, just 4 ft. 7 in. long, beautifully marked, and glancing with restless eyes and agitated tongue as the snake-charmer handled it without fear. One could not help a momentary shudder at being in such close proximity to so poisonous a beast, whose bite would be death in a few minutes; but the native vendors assured the *sahibs* that the poisonous fangs had been drawn, and we gradually assumed sufficient courage to handle it.

We should not have done this had we known that one fang, although drawn from the socket, was still in the gum. This I found there on ultimately skinning it, and the tooth is now in my possession.

The main object in buying the snake was that it might be stuffed, and we accordingly set to work to kill it, first pouring down its throat nearly a wine-glassful of spirits of ammonia; and having waited half an hour without observing any effect, a spoonful of prussic acid was administered with a similar fruitless result. The poor brute was then handed over to me, and I carried him away in a small flat wicker basket, in which he was coiled.

It was now my turn to see what could be done with him, and I thought drowning would dispose of him effectually without affecting the colour of the skin.

To carry out this idea I put him, basket and all, into my earthen bath (a large chatty about 3 ft. deep), with a weight on the lid of the basket to keep it at the bottom, and there left him for full three hours until late in the evening. I then took him out, and considered him quite dead, as he was handed round amongst us as perfectly limp as a yard and a half of tape.

Purposing to skin him in the morning before the sun was up, I put a noose round his tail and hung him to a nail in my bath-room bulkhead, to let the water run from his mouth; and here he dangled, when I turned in, as straight as a line.

Soon after daylight I was up to commence operations on his snakeship, and opened my bath-room door to unhang him, when, instead of the limpid creature I had left on the previous night, he had coiled himself into a knot, and was spitting at me from the centre of it with his forked tongue, shooting it in and out, and his eyes lighted up with a fierce and angry glare.

My astonishment was of course great, but I soon unhung him, and having laid him on the floor to uncoil, put him again into his basket, and the basket once more into the bath.

Two hours passed, and he was in the same limpid state as after his former immersion, so, without giving him time for a second resuscitation, I skinned and stuffed him forthwith, and he now figures in a glass case with other specimens.

ARGALA.

STINGS OF WASPS AND BEES.

THE remarks of "R. H. N. B.", in a recent (December) number of SCIENCE-GOSSIP show that he has made a careful examination of the lancets of the sting, and they display much acuteness of observation so far as they extend. Still, I think he is in error in supposing that "a tube runs along the whole length of the lancet from the poison-bag with branches to three or four teeth near the extremity."

In favour of his supposition there is, first the opinion of Mr. P. H. Gosse, no mean authority, and which appearances certainly confirm, that the lancets are hollow; this he proved by the best possible test, viz., the presence of movable air-bubbles in the body of the lancet. Secondly, I think it may be admitted that at a certain focus there is *the appearance* of branches from the hollow tube of the lancet to the teeth.

These admissions are far from affording sufficient grounds for the probability that there is a passage of the poison from the bag down and through the lancets at their extremities, or at the extremities of the points of their barbs, and there are strong reasons against the probability of the passage of the poison in this manner.

To determine with accuracy the points in question, the sting of the wasp is the best subject for examination, because the tube or duct from the poison-bag to the sting is in this case long, and easily to be traced. It will be requisite that the dissection shall have been carefully performed, so that the entire structure shall be clean and unbroken, and comprehend the sheath, the two lancets, the poison-bag, and duct.

It will then be found that the lancets lie in the sheath for only about one-half of their length; that after passing out of the upper portion of the sheath they diverge and become finally attached to the levers, which assist in their motion; that the duct which conveys the poison passes down between and behind the two lancets, and into the sheath, and that it may be traced passing down the sheath behind the lancets for about one-third the length of the sheath; that there can be no communication between the poison-duct and the lancets until after both have entered the sheath, and that there is none for the third part of the length of the sheath.

In tracing the course of the duct in the mounted specimen it will be of advantage to use polarized light in the examination: the chitonous portions polarize well and become brilliantly coloured, and the duct can then be more readily traced to its point of attachment to the sheath.

Now, if the poison finds an entrance into the lancets, there must be apertures in them at about their centre for its admission. No such apertures have ever been spoken of or observed. Again, there must be apertures at the extremities of the lancets and barbs, if the poison pass through them; no such apertures have been observed.

On the whole, I would conclude that the lancets are hollow, to secure lightness and strength of structure; that the appearance of branches from the hollow tube of the lancet to its teeth is deceptive; that the poison passes down the sheath and out of the aperture at its extremity, which is plainly visible; that the ends of the lancets when in action are well bathed externally with the poison, which is at the same time poured freely into the wound formed by the lancets.

I believe this interpretation of the action of the lancets and poison to be most in accordance with the structure of the sting, and with that simplicity of plan which rejects a complicated and roundabout way of effecting that which may be accomplished by more direct and simple means.

Other points of inquiry connected with the structure and operation of stings are to me of greater interest, because of more doubtful and unsettled determination; such as the possible formation of crystals by the evaporation of the poison of the sting, and the uses of the feelers, or hairy appendages that are attached to the extremities of the levers that move the lancets.

Of the crystals (SCIENCE-GOSSIP, 1868, page 151) I have obtained a second instance, and I have repeatedly confirmed my opinion of the structure of the poison-bag to be that which I have explained in my article on that subject; but I feel anxious to investigate more fully, and to determine satisfactorily, the causes of the appearance and occurrence of the crystals, which already have excited considerable interest. As to the palpi, or hairy appendages, I can only say, that I have examined the lancets of many gall-flies, and the saws of many saw-flies, with a view to determine their structure and uses. I have found that in every case they are attached to the levers of the lancets, and vary much in figure and magnitude in different species of hymenoptera. They have been set down as being "guides to the action of the lancets," and as being "employed in oviposition, to receive the egg from the oviduct, and to fix it to the wall of the cell." I would say, that in all probability their uses are, that by their

action they should give smoothness and uniformity to the motions of the lancets, and also to act as feelers, to direct as to the occasions and limits of the use of the sting. This, however, is purely hypothetical.

It may be interesting and useful to some, to give an account of my mode of preparation of the sting. I use the simple microscope in dissecting; with a magnifying power of about an inch focal length. I remove the last segment of the abdomen of the wasp and place it on a glass slide; I then with needles separate and take away the external covering of the segment, and with a camel-hair pencil and needles carefully wash away and separate the muscular tissue, so as to leave the sting and brushes or palpi clean, and the sheath, duct, and poison-bag in a line on the slide, clean and unbroken, taking especial care that the poison-bag receives no puncture from the needle, or any rupture by rough treatment, and that the duct from the poison-bag to the sheath be plainly seen, and be not entangled in muscular fibre.

All this can be done on the glass slide, the dissection being kept moistened with water sufficient to cover it, without causing it to float, until everything be removed except the parts required. I then place the dissection in position in the centre of the slide, and leave the slide under a glass shade for about a week, until the sting, &c., has become perfectly dry, and the poison fluid in the bag, if any, has had sufficient time to evaporate. I then moisten with a few drops of turpentine, and mount immediately in balsam.

I use no pressure at any time that would distort the parts, my object being, not so much to make a beautiful preparation, as to obtain crystals from the poison fluid, and also to see the parts of the structure in their natural position.

This method will give very interesting and beautiful slides, from dissecting gall-flies and saw-flies, and will sometimes bring instances of structure to view singular and curious, that I think have not yet been illustrated or explained.

Armagh. LEWIS G. MILLS, LL.D.

A HAILSTORM.

ALTHOUGH meteorological phenomena are not often recorded in the pages of SCIENCE-GOSSIP, it may not be without interest to the readers of its pages if I contribute a brief record of a storm which passed over Edmonton on Wednesday, the 7th August. 1872. I had gone there shortly before seven o'clock in the evening by the new line of railway recently opened by the Great Eastern Railway Company, and upon approaching Edmonton, the sky gave unmistakable indications of a coming storm. To the right, in the direction of Epping Forest, the atmosphere was tolerably clear, but on the left the line of the horizon was almost lost in a heavy mass of purple-black clouds, out of which came occasional flashes of what is commonly called sheet lightning.

Beyond this indication that a thunderstorm was travelling on the west of the line of railway, there was nothing exceptional to remark. On leaving the new station at Edmonton to cross the old line, the time being then seven o'clock, a few black clouds came overhead, travelling at a great pace. They were apparently so close to the earth, that a child standing near to me made the expressive remark, that they would fall on the houses. In another moment the nearest cloud was torn into shreds, as though a violent explosion had taken place in its centre, and in a few seconds more followed one of the most remarkable falls of hail which I have ever seen.

Meteorological annals abound with descriptions of remarkable hailstorms; many of them so marvellous that to believe the descriptions of them is rather a tax on the imagination.

Some Farmers' Insurance Companies have published accounts of storms of wonderful character; but in these instances a little romance is pardonable, and when I have read of hailstones as big as hen's eggs, oranges, and the like, I may perhaps be excused for being a little sceptical.

The storm at Edmonton on the 7th August, however, was a fact, and as I watched it carefully, and examined many of the hailstones which fell, I have no hesitation in stating what I saw. In shape the stones bore the same character as those described by Herschel, Howard, Clark, and other observers, and although they were not so large as to rival the hailstones which are said to fall in the Himalayan regions, their size was sufficiently remarkable. The largest stone I could find had projections at either end tapered to a point. The stone bore all the appearance of having possessed a number of radiating spines, if the projections on the surface may be so described.

Of one type of hailstones there were many specimens, varying in size from a pea upwards, and all bearing the same hexagonal markings. In several there was a well-marked cavity in the centre, occupying about a third of the bulk of the stone. Upon breaking such stones across, the cavity was found to be dry in some instances, and filled with water in others.

During the storm, which raged for about twelve minutes, the flashes of lightning were extremely vivid, and followed each other at very short intervals. When the hail passed over, rain followed, but during the time the hail fell, there was no indication of rain, a feature which is, I believe, common to these phenomena.

Another circumstance not unusual during severe

hailstorms, was that the track of the storm appeared to be confined to a limited area. Thunderstorms prevailed throughout the day in various localities, but I have not heard that any other place was visited by so severe a hailstorm.

J. F. T.

ON CERTAIN WINGLESS INSECTS.

By T. W. Wonfor.

HAVING now classed the wings, and shown that, with but two exceptions, all the insect tribe possess four wings, or their modifications, we will proceed to certain exceptional cases, in which the wings are so little developed, or are so perfectly rudimentary as to be altogether useless to their possessors as organs of flight. This is the more remarkable from the fact that some members of the family have well-developed wings, and especially that occasionally the males alone possess the power of flight, while the females, who would seem to want it most, are utterly unable to fly, or, in some cases, to move more than a few inches from the places where they have escaped from the chrysalis.

Among the moths is a small group, the *Liparidæ*, so named after one of their number, *Liparis dispar*, the Gipsy, characterized by the great breadth of their wings and smallness of their bodies, and nearly allied to the swift-flying moths, the *Bombycidæ*. These latter include the Lappet, Oak Eggar, Kentish Glory, &c., some of which are not only noteworthy for their great powers of flight, bnt also for the very strange habit, "sembling," that is, the collecting together of large numbers of the males, drawn from long distances by the females, instances of which have been detailed to the Society on former occasions.

Fig. 34. Vapourer Moth (*Orgyia antiqua*), Male and Female.

Among these *Liparidæ* are those pests to the orchards of Kent, the Brown-tail and Gold-tail moths. The caterpillars of all are hairy; some are characterized by peculiar tufts of hairs, as seen in the well-known Hop-dog, while the common Vapourer (*Orgyia antiqua*) and the scarce Vapourer (*Orgyia gonostigma*) have tufts of long hairs as well, pointing over the head like brushes, each hair being tipped with a small knob. The caterpillars of the first (*Orgyia antiqua*) feed on many plants and shrubs, while the latter feed on the nut and oak, and each, when it is about to change to the chrysalis, spins a loose web intermingled with its hairs, and turns into a hairy chrysalis. The moths, which escape from the chrysalides, are, from their peculiar rising and falling flight, called "Vapourers." The males of both species have slender bodies and very broad wings, and are met with, not simply in the country, but in the very heart of towns and cities. At the proper time of year they may be seen "vapouring" among the trees on the Level.

The females of both species are nearly wingless, have large bodies, and are as unlike moths in appearance as is possible to conceive. The colour, too, is different from that of the active males, being of a dull grey or ashy brown, while the males are richly tinted, and in one case marked with a white spot on the upper wing. So slight is the power of locomotion in the female, that she very seldom gets beyond the empty cocoon on which she lays her eggs and dies. But though so unattractive to human eyes, they are not to their male admirers, as may be proved by taking a newly-escaped female in the neighbourhood of male vapourers, for then they come flitting around, and soon settle on the box containing the captive female.

Our next examples will be taken from a very large family of moths, the caterpillars of which differ from those of other moths and butterflies in the number of their "false legs," and also in their mode of progression. The caterpillars of moths and butterflies possess, as is generally known, six true legs, and in addition ten false legs, or "claspers," by means of which they hold on. In one great family most possess only four of these claspers, which are situated at the tail end, so that the caterpillar cannot hold on by the middle of the body; the consequence is, that when it walks, the middle of the body is looped, from which circumstance they have been called "Loopers," and from their appearing to measure the space they traverse, they have been denominated *Geometræ* or "earth-measures." Many of these caterpillars resemble in colour the leaves or stems of the plants on which they feed, and when at rest cling by the anal claspers, and stand out at an angle from the twig, in which position they so much resemble a stick or twig, that the name "Stick" caterpillars has been given to them. It is among this family that the power is possessed of linking the two wings together, when the insects fly. Another peculiarity belonging to some is that they rest with their wings folded back to back like the butterflies.

Among the Geometers are several moths, the females of which either have small and useless wings, as far as they are considered instruments of locomotion, or so aborted as to appear altogether wanting. Thus in *Hybernia rupicapraria* (the Early Moth), which appears in January, the wings of the male are ample, and of a dark brown colour, the wings of the female are very short, and cut off obliquely at the hind margin, while the body is short and stout. In *Hybernia*

leucophearia (Spring-usher), the wings of the male are long and rather narrow, while those of the female are scarcely perceptible. In the Scarce Umber (*H. aurantiaria*), which appears in October, the wings of the male are very large, while those of the female are mere stumps: the body is larger than in either of the others. In another species, the Dotted Border (*H. progemmaria*), which appears in February, while the wings of the male are large, those of the female are too small for the purposes of flight, but more ample than any other of this degraded, *i.e.* imperfectly developed, group. Another *Hybernia*, *H. defoliaria* (Mottled Umber), which appears in October, has, as regards the male, large wings, but the nearly wingless female looks, when on the trunks of trees, like a spider; and the deception is the greater, owing to the length of her legs, and the markings on the body. In *Anisopteryx æscularia* (Marsh Moth) wings are quite wanting to the female, while those of the male are ample. In that destructive pest to plantations and orchards, *Chimatobia brumata* (the Winter Moth), thousands of which may sometimes be met with at this time of year, the wings of the female are too short for flight. In places where they abound, the females may be seen crawling like spiders over the tree trunks, while the males flit easily about.

Another group of the Geometers noted for their robustness and the strong character of their wings, contains three species in which the females are apterous. These are the Brindled Beauty (*Phigalia pilosaria*), the Belted Beauty (*Nyssia zonaria*), and the small Brindled Beauty (*N. hispidaria*). This is the more remarkable because in this family there are only three other species, *Biston hirtaria*, *Amphydasis prodromaria*, and *A. betularia*, in all of which, strange to say, the females have a larger expanse of wing than the males.

There is one more group of moths in which the females are more degraded than any of the examples already given; in fact, it has been remarked of them that they are simply egg-sacs, while the males are pretty lively moths. They have seriously been the subject of much difference of opinion as to what group of moths they should be classed with, some at one time leaving them with the *Bombycidæ*, and others with the *Tineæ*. They are known by the name of the *Psychidæ*, and are remarkable from the habits of the caterpillars, which form for themselves a case, somewhat similar to that constructed by the caddis-worm, composed of pieces of bark, leaf, or some similar material, fastened together by a kind of glue or silken substance secreted by the caterpillars. When engaged in eating, they protrude a portion of the fore part of the body from the case, and, as they increase in size, enlarge the case by first slitting it, and then letting it out by the addition of more material. Before moulting or changing to a chrysalis, the mouth of the case is closed, and in the latter state it serves the purpose of a cocoon. When the final change takes place the male escapes, but the female of one, *Fumea gemella*, crawls out, in appearance like a little worm, and, after depositing her eggs in the case, dies. Others, like *Psyche graminella*, if females, do not emerge from the case, but deposit their eggs within, die, and shrivel up. The young larvæ commence their experience of life by eating up their dead mother's body, as rank a case of cannibalism as one could wish for, being, to say the least, an unnatural proceeding. Some of the female Psychidæ are not only wingless, but almost footless, without *antennæ*, and have eyes without facets.

Two or three questions naturally arise as to why the females should be so different from the males. Is there any perceptible difference in the caterpillars to account for the difference in the moth? Are there analogous cases among other insects? To the first question no satisfactory answer can, at present, be given. Those who have experimented upon moths and butterflies know that alternations of scanty and bountiful food, or keeping them on scanty food only, tends to produce dwarfs and monstrosities, and that, keeping chrysalides rather dry, or exposing escaping moths and butterflies to the action of dry heat, prevents the unfolding of the wings. These things, however, take place with males and females alike, and no such conditions can possibly exist in nature and always produce wingless females. Again, granted it is hereditary, why should it be confined to the female line?

To the second question we reply, that although some have fancied that a difference can be detected between the caterpillars which will produce males and those which will produce females, we believe it is, after all, mere fancy, and that, whether there is any essential difference existing either in the eggs or the larva, it is at present one of the unexplained mysteries.

To the third question an answer in the affirmative can be given. Not alone among the Lepidoptera are there wingless females. One of the most striking examples is the cochineal insect, in which, while the males possess wings, the females are not only destitute of wings, but almost of limbs: the absence of wings is also seen in the summer or immature females of the aphides. Some species of "walking sticks" supply wingless females; among the cockroaches the wings are sometimes wanting in the females, while in the parasite *Strepsiptera*, the females are not only destitute of wings, but were for a long time, from their worm-like appearance, mistaken for larvæ, till dissection showed that these worm-like creatures were full of eggs. But perhaps the best-known example is the Glow-worm, the females of which *alone* are luminous, and present the appearance of flat greyish brown larvæ, quite destitute of wings, while the males are active and fly well.

It certainly seems a very strange phenomenon, and is opposed to what we might imagine the fitness of things, that, as far as the continuance of the race is concerned, the more important of the two sexes, the females, in so many cases, are unable to go far from home. We think this fact, together with the circumstance that the so-called perfect form falls far short of the larval state in the means of locomotion, external decoration, or the possession of some organs, renders the inquiry, "Why are some insects wingless?" worthy the consideration of scientific naturalists.—*Trans. of Brighton and Sussex Nat. Hist. Soc.*

QUILL-WORTS.

A SHORT reference to a class of the Marsileaceæ, R. Br. (Lycopodiaceæ, Berkeley, in "Treasury of Botany"), of which several new species have of late years been discovered in Algeria, may be interesting to the English botanist. I allude to the Isoetes (Quill-worts), of which one species only, viz., the *I. palustris*, appears in Hooker and Arnott's British Flora.

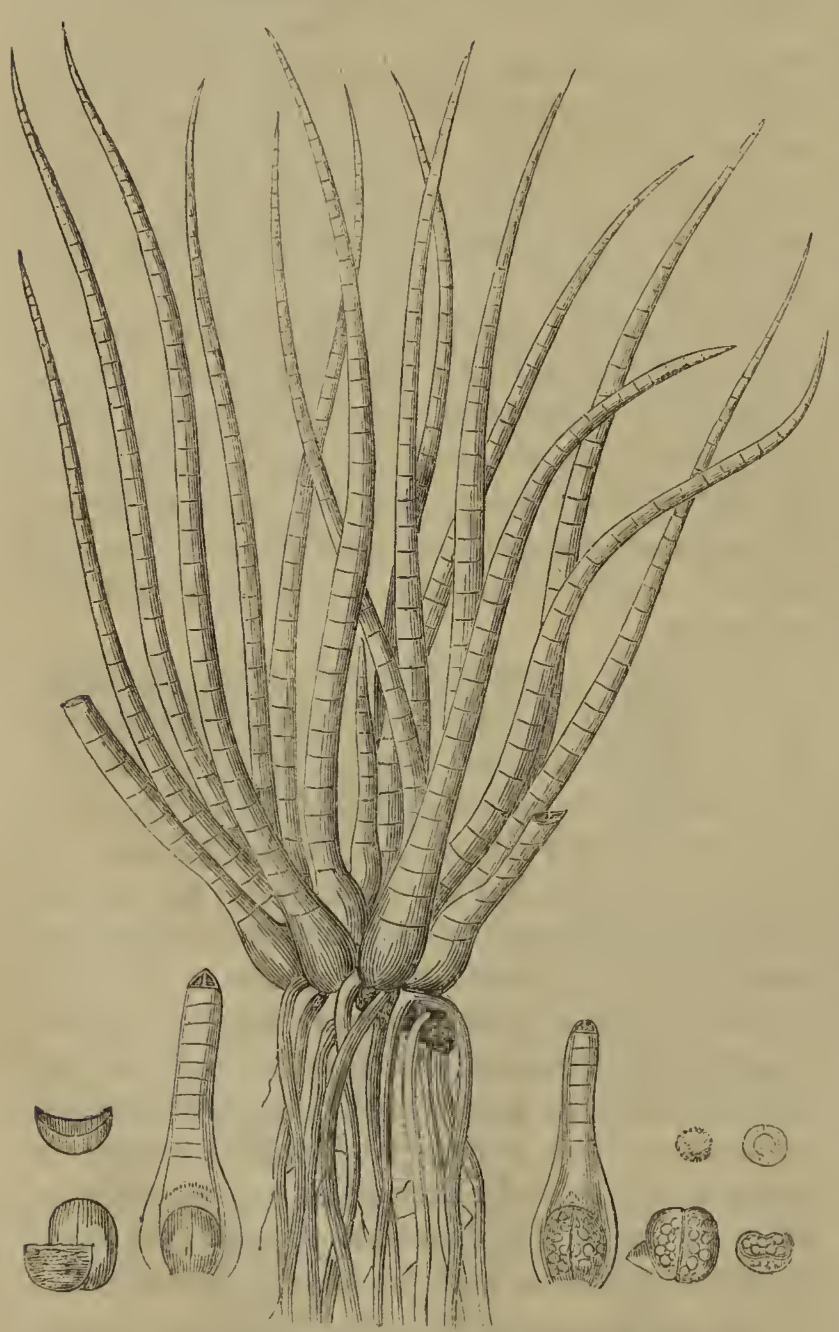

Fig. 35. British Quill-wort (*Isoetes palustris*).

Some of the Isoetes are aquatic, others terrestrial; the former, consisting of *I. setacea* of Grammont Montpellier (*I. Delilei*), *I. Peyrremondei*, and *I. longissima*, both of Algeria, and the British *I. lacustris*. Of the terrestrial there are two, viz., *I. histrix* and *I. Durienæi*, both of Algiers. The *I. setacea* of Montpellier, as being better known, it is hardly necessary to describe; and the *I. Peyrremondei*, Bory, is only a variety of it, not more than half the size, found in the south of France as well as in Algeria. The *I. longissima*, found near the Lac Houberia, Canton de la Calle, is distinguished by the fineness and enormous length of its leaves, and with a bulb proportionately smaller than all the other species. Of the terrestrial, the *I. Durienæi* is found in the lightest sandy ground near the town of Algiers; it has a large bulb, and at the base of each leaf are three sharp teeth (not spines). The *I. histrix* has altogether a singular appearance, quite different from all the others; has a bulb covered with *spines*, three at the base of each fallen leaf, dry and hard to the touch, black and shining, and so long and numerous it might almost justify the name of a miniature vegetable hedgehog; it is found in the very driest and hardest uncultivated ground, where the bulbs are no larger than those of the *I. lacustris;* but in very moist fine sandy surface soil (the shallow drainage from cultivated land) it is found as large as a small walnut. M. Bory de St. Vincent planted some bulbs of the *I. histrix* taken in April or May, in the following November, in mould, which produced fine plants the following spring. He also reared some under water, the same as the *I. lacustris*, without their losing any of their characters. Some bulbs that I gave to Professor de Notaris, of Genoa, were planted and succeeded in ordinary mould. I gave some very fine specimens of all that I had collected to the late Sir William Hooker, and suggested that he should plant some of them; but he replied they were too precious, and must go into the herbarium. It appeared that he had never seen them before. It is said the *I. histrix* has been found at Cannes, on the Mediterranean; and Mr. Berkeley says it has lately been found in the Channel Islands, though he adds, it may be another species. Mr. Reuter, Director of the Jardin des Plantes at Geneva, tried to rear the *I. histrix* from seeds received from Mr. Bory, but failed; from which it would appear they only retain their vitality in the bulbs. I believe the *I. Peyrremondei* is identical with the plant better known in Algeria as *I. vellata*, being found both in water and very moist soil.

T. B. W.

HUMMING-BIRD HAWKMOTH.—I have known this creature, like some other insects, counterfeit death when apprehensive of danger, fall on its back and appear in all respects devoid of life, when in a box. As soon as a fit opportunity arrived, it would dart away with its usual celerity.—*Knapp, "Journal of a Naturalist."*

NOTES ON THE GIZZARD-SHAD IN NEW JERSEY.

By Dr. Charles C. Abbott.

Far away, in quiet, maple-shaded ponds, where the deep-voiced bull-frog sounds his doleful ditty, and the sprightlier swamp-frogs on the reedy shores, and bell-tongued Hylas on the drooping branches of the overhanging trees, wake the dull echoes with a livelier song—here, "out of the world," as it were, in green and sluggish waters that tempt no seeker for romantic scenes, there roams, in listless mood, a great lazy, leaden-coloured fish that denies in its habits any kinship to the great Herring family, to which it belongs.

In many such ponds, year in and out, these inland herring (*Dorosoma cepedianum*, Gill) live and move, and have their being, subsisting on the myriads of small shells that they crush to atoms in their dense, muscular stomach, and occasionally, when moving about in search of food, giving notice of their presence by the light ripple made by the long ray of their dorsal fin floating, eel-like, on the surface of the water.

We have purposely headed our paper with the announcement that we treated of this fish only as found *in* New Jersey; for if we go beyond the limits of the inland ponds, and study the ichthyology of the rivers, especially the Delaware, we will find that of the migratory fishes the herrings (*Clupeidæ*) are the most important feature of the finny fauna, the magnificent shad (*Alosa præstabilis*, De Kay) heading the list in point of value, and our gizzard-shad coming in "last," both in matter of numbers and value. So, too, this "shad" is found on the coast, not in great numbers, but in scattered companies, associated with the innumerable shoals of his cousins.

It is not always easy to determine how these "herring" have gotten into some of the ponds in which they are found, or why, when the "in-letting" cause—say, a freshet—is repeated, they do not take advantage of the fact, and turn it to an "out-letting" incident. Speculation, however, availeth nothing in this case. We can make no scientific use of our imagination here; and so, suffice it to say that in some ponds these queer herring are truly, permanently land-locked, and flourish admirably.

Of their habits as a land-locked fish we propose to say something, and also of that anatomical peculiarity that they possess, the "gizzard," or muscular stomach.

Perhaps an unquestionably lazy fish. that does little more than move about from lily-stem to lily-stem for the myriads of little shells that wander up and down these slimy, snake-like growths, can be said *not* to have any habits. But they do accomplish something more than this, which one who had made but their accidental acquaintance might suppose was all, for early in April they undoubtedly "fall in love."

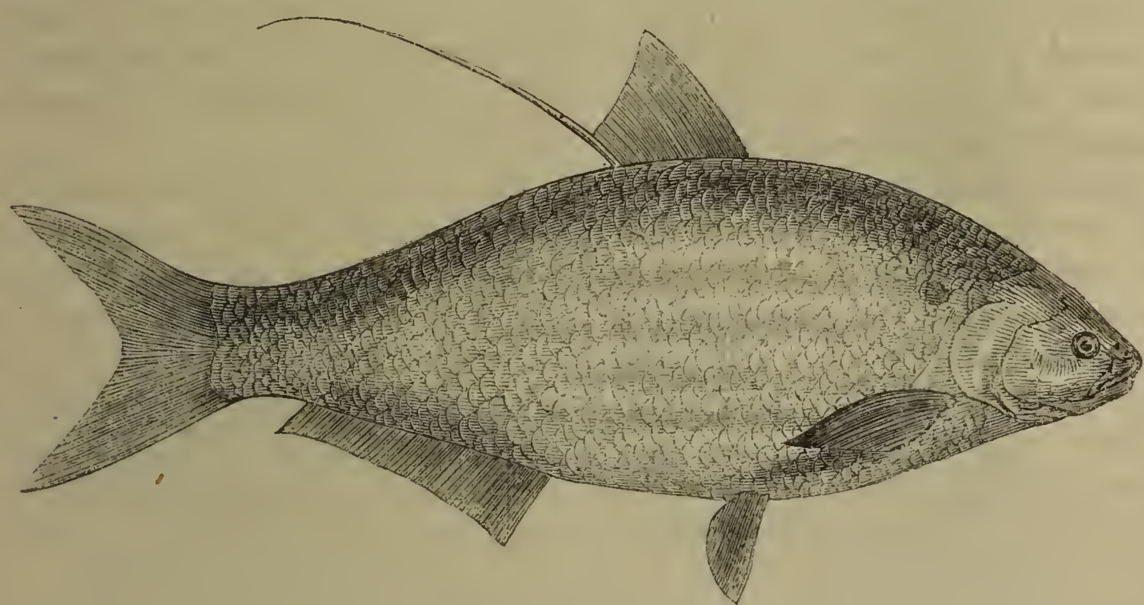

Fig. 36. Gizzard-shad (*Dorosoma cepedianum*).

It would seem as though they caught the true meaning of the warblers' merry notes, and were inspired by the crimson flashes of light that glance upon the water as the madcap oriole in his nuptial dress rushes hither and thither among the trees. The dull, leaden tints of the Gizzard-shad become now a glistening blue, and sparkling silver decks their ashy sides. No water seems too cold, and none too shallow for them. They dart like pickerel up the tiny brooks, and skip and dance about the deeper ponds as though too joyful to contain themselves. From the muddy depths they rise to the surface, and throwing themselves upon their sides, leap above the water, as though challenging the birds to match their brilliant colours. Day after day this excess of action is kept up, and ends, as all such manœuvrings ever do, in a profound reaction, when their humdrum existence returns, varied a little from the later summer months by a few weeks'

guardianship of tender, "knife-blade" specimens of finny creatures which at an early age seem to assume the monotonous life of their elders, and leaving them, set up for themselves.

In spite of our many efforts we have never found young Gizzard-shad less than a week old, nor could we ever spy them out while yet *in ovo*. But they are, nevertheless, an oviparous fish, the "roe" and "milt" being readily found, and as easily extruded as in the shad proper and herring, especially during the week or more that its presence provokes the wild antics of its possessor during our second spring month.

Why, we naturally ask, was this gizzard evolved, which, on dissection, we find the Dorosoma has? If we looked at its food, we found this gizzard was admirably adapted to crushing the *Lymneæ*, *Paludinæ*, and other shelled creatures on which this fish subsists mainly; but, on the other hand, we find several other fish with no such muscular stomach thriving on the same food. For instance, we find the yellow perch (*Perca flavescens*), the Pond bass (*Ambloplites pomotis*), and the larger sunfish (*Lepomis auritus*) may be seen in clear waters to feed upon these same shells; and occasionally a chub (*Semotilus rhotheus*) will swallow and mash one of them with its well-developed pharyngeal teeth. In all these cases it will be seen that strong, thickset teeth come in play to break up the shell of the animal devoured; but with this herring there is no set of teeth or any bone that will crush a shell; and hence the necessity for something that will. Does this "necessity" give rise to the "gizzard"?

It may, perhaps, be asked, if this fish has not suitable teeth for eating shell-bearing creatures, why not feed upon something else? or, if it must subsist upon the *Lymnea*, *Paludina*, and such animals, why did not the persistence in so feeding develop the jaws and lengthen and strengthen the teeth? One might as well ask why should the herring not be a polyzoa feeder, and need neither teeth nor gizzard? Enough to know that the food has developed a capacity to digest it, and not the capacity to digest suggested the food. This is shown when we compare the gizzard of the marine fish with that of the land-locked species. We then find in the latter that the gizzard is much less muscular in its walls and smaller in all its measurements; and the difference in the food, as found on examination, shows that the marine fish's larger stomach has an amount of work to do about equal to the difference in the strength of the shells of the marine and fresh-water species that constitute the bulk of the food of this herring.

As the muscularity of the stomach in this case varies with the character of the food—the size of the fishes, marine and land-locked, being the same—it is logical to maintain that the food *ab origine* produced a muscular thickening at a convenient point of a digestive tract, which became, by being inherited, ultimately a gizzard such as the gallinaceous birds now have. We say, by being inherited; for both the habit of feeding on shell-bearing animals, and the anatomical advantage, as the incipient gizzard may be called, would be transmitted to the offspring, or some of them; and if only to some, then they would thrive better than their fellows, for having it.

A curious fact, in this connection, consists in the habit that these fish have, of swallowing the coarser grains of sand, which help to crush down the shells, just as chickens swallow gravel to help to digest the grains of corn that they have eaten. Furthermore, on examining some marine specimens, caught at sea, the gizzards also were found to contain gravel stones, but all of a larger size, seeming to correspond with the increased muscularity of the gizzard, and density of the shells swallowed by the fish.

One word more, and we have done. This fish at sea, no doubt has it enemies; and when land-locked and free from these, it might be thought to thrive beyond calculation. Such, however, is not the case. The young are greedily devoured by the pilse; and the lamprey (*Petromyzon*) seems to be particularly partial to the adult fish. It secures an attachment to the gills of the "Shad," and literally worries it to death.

THE IRISH NIGHTINGALE.

A GENTLEMAN (for I hope it is not one of the fair sex) who signs himself "Leprahaun," has an article on the above subject in SCIENCE-GOSSIP for September, 1872. In order to obviate the necessity of constantly giving "Leprahaun" his full title, I shall curtail it to "L.," as when we Irish think of leprahaun, a little man dressed in red, about eighteen inches high, seated on a three-legged stool, with his legs crossed, and busily engaged mending a "brogue," rises up in our imagination. If you could possibly catch this little individual, who may most frequently be found in quiet, out-of-the-way places, your fortune would on the moment be made. If you want to succeed in this feat, you must not lose sight of him; keep your eyes fixed on the man and the stool. Every leprahaun has charge over an immense "pot of goold;" and if you hold him fast, and watch him steadily, he will not fail to show the hidden treasure. So the story goes among the country people in this neighbourhood, and so I learned it when a boy.

"L." asks, "What is that shy, sprightly little bird which swings so curiously from yonder giant bulrush, its coal-black crest perkily raised, its throat throbbing in passionate song?"

He then goes on to describe the darts and the dives which the supposed Irish nightingale takes. This is all very good. But both the Boyne fisherman and Mr. L. have committed a great ornithological mistake if they imagine that the Irish nightingale has a black head. I am not a little surprised that L. should have failed to discover the name of a bird he has seen so frequently both "by night and day." I shall now proceed to state the points upon which I differ from "L.," and it is to be hoped I may convince him of his mistakes. In almost every case I shall add the Latin names, as English and local ones are constantly varying, and create a large amount of confusion.

Fig. 37. Sedge Warbler (*Sylvia salicaria*).

The mistake which "L." stands charged with is this. He has confused the Reed Sparrow (*Emberiza schœniclus*, Linn.) with the Sedge Warbler (*Sylvia salicaria*, Lath.). He has also fallen into two other errors. 1st. He has used the terms "Hedge Warbler" and "Reed Sparrow," as if they were synonymous. Now, although I have heard a good many English synonyms for *Emberiza schœniclus*, I never yet heard it called the "Hedge Warbler." 2nd. He has wrongly quoted the venerable Gilbert White, so far, at least, as I can find out. This prince of naturalists is made to say in my edition that the Blackcap (*Motacilla atricapilla*) is in its song "superior, perhaps, to those of any of our warblers, the nightingale excepted." "L." makes him say that he is "superior to any songbird we have," &c. The bird which "L." describes in the beginning of his letter is the *Emberiza schœniclus*, or Reed Sparrow. He may have seen him by night, but rarely, I should say; and I doubt if he ever heard him sing during the dark portion of the twenty-four hours.

"L." would oblige me by stating what bird the *Passer arundinaceus minor* is. If it is the same as *Emberiza schœniclus* (although my scanty ornithological library fails to give me such a synonym), this bird, as I said before, does not sing during the night. "L." states that, "so far as he can ascertain," the "Reed Sparrow, or Hedge Warbler," is never given a black crest by any author except Bewick, who calls it the "Black-headed Bunting." Pray what author ever assigned the Reed Sparrow, *alias* the Black-headed Bunting, *alias Emberiza schœniclus*, Linn., any other colour except black to the feathers which surmount his cranium? and who ever gave a sooty crest to our well-known Hedge Warbler (*Accentor modularis*, Cuv.)?

"L." has evidently taken the Reed Sparrow to be the Irish nightingale. This bird is the Irish nightingale's most intimate companion; both have reedy homes by river banks. But the *true* Irish nightingale is the Sedge Warbler (*Sylvia salicaria*), which

is an extraordinarily clever musician, imitating at will the swallow, sparrow, thrush, lark, &c., and so, no doubt, he frequently mimics his friend the Reed Sparrow. I shall quote from the work of our great Irish naturalist, Thompson. Speaking of *Emberiza schœniclus,* he says: "In many parts of Ireland the Reed Bunting has the undue reputation of being a sweet songster of the night, and is believed to be the veritable 'Irish nightingale,' a name bestowed on the mysterious bird, be that what it may, which sings through the summer night. In strict justice, the Sedge Warbler may lay claim to the flattering appellation. Montague, with his usual acuteness, long since accounted for this error in the following words: 'It is somewhat extraordinary that the manners and habits of so common a bird should remain so long in obscurity; even modern authors tell us it is a song-bird, and sings after sunset. . . . There can be no doubt, however, that the song of the Sedge Warbler has been taken for that of this bird; for, as they both frequent the same places in the breeding season, that elegant little warbler is pouring forth its varied notes concealed in the thickest part of a bush, while this is conspicuously perched above, whose tune is not deserving the name of a song, consisting only of two notes, the first repeated three or four times, the last single and more sharp.' Reed Sparrow and Blackcap are the names commonly bestowed on this bird in the north of Ireland."

Such is the language of two great British ornithologists—Montague and Thompson,—who clear up the whole matter better than any words of mine. "L.," in the beginning of his letter, states, "A stone thrown into the water will at once arouse him, and his note, answered by a hundred others, fills the night with music." Thompson, speaking of the Sedge Warbler, says: "What may perhaps be termed its boldness is evinced by any object flung into its haunt prompting the bird to sing, as if in defiance of the interruption, or, as a well-known author might imagine, to keep its courage up." Your readers may see how nearly the two accounts correspond.

Passing over the dash of green which "L." would affix to the Reed Sparrow's wing, I must now conclude, hoping that "Leprahaun" is convinced that the Irish nightingale has not a black head, but is none other than the Sedge Warbler (*Sylvia salicaria*). R. M. Barrington.

Fassaroe, Bray, Co. Wicklow.

"It is Love that secures the *universal equality* between beings and species. Let there be no more pride. The same law prevails from the greatest to the least—in the star as in the flower. There are no grades of high or low either in heaven or in love —which, moreover, is heaven itself."—"*The Mountain,*" *by Michelet.*

THE GOAT-MOTH.

(*Cossus ligniperda.*)

Many observing persons in their rambles may have noticed that the trunks of various trees are studded in divers parts with numerous holes of considerable size, but at the same time may be at a loss to know he cause thereof. These are the work of the *Cossus,* or "Goat-moth," as it is popularly termed, which, in its larval state, feeds within the solid trunks of trees, rendering the wood valueless, except for fuel. Perhaps these holes do not so easily attract one's notice when a tree is covered with its bark as when it has been deprived of it; for then may the work of the *Cossus* be seen to perfection. I once saw an alder-tree apparently but little infested by *Cossi* when covered, but upon stripping it of a portion of its bark, I found it to be literally honeycombed by the work of these destructive creatures. Its presence is made known not only by the holes it drills in the trunk of the tree, but also by its sawdust-like *ejecta* lying at the foot of it, and more especially by an uncommonly strong and disagreeable odour that pervades its locality, and which can only be compared to that of a he-goat. It is from this peculiar scent that the creature obtains its name of Goat-moth.

The larva of this beautiful moth has been the sole cause of destruction to many a noble tree, and it is, perhaps, one of the worst enemies the gardener has to contend with; for a tree once becoming infested with it is doomed to destruction unless the pest be speedily removed. In six or seven years the *Cossi* will have completed their work, even if the tree is of considerable magnitude. Nor can this be wondered at when it is known that the *Cossus* is one of our largest indigenous moths, measuring on an average from three and a half to four inches in expanse of wing, and that the larva spends three years feeding. Bad as its ravages are, they would be far greater were it not kept in check by its enemies, entomologists, ichneumons, and the woodpecker. The last-mentioned cuts large holes in the tree with its powerful beak in order to extract the dainty morsel.

The *Cossus* seems more partial to the willow than to any other tree, but it is also to be found in the alder, elm, oak, lilac, and ash. Pliny mentions it as feeding upon oak, pear, apple, and fig trees. I have not found it in the trunks of apple-trees in this locality; but our apples, as well as elms, lilacs, &c., are very much infested with another wood-boring larva of a smaller moth, called the Leopard (*Z. æsculi*). Fortunately, this creature does not do so much harm as the *Cossus;* for, spending but a short period within the tree, its ravages are comparatively small.

The *Cossus* of this country was well known to the

Romans, with whom it was in great request as a luxury, and they swallowed the larvæ with the greatest gusto when cooked. Pliny says the larvæ were prepared by fattening them with flour, and the following extract from him will show how highly the *Cossus* was esteemed by the epicures of his time: "Jam quidem et hoc in luxuria esse cœpit prægrandesque roborum delicatiore sunt in cibo cosses vocant."

He also says *Cossi* "cure all ulcers;" and on account of this medicinal virtue, the odoriferous larvæ were actually made into ointment.

This is not the only insect that formed, and perhaps in some countries still forms, a part of man's diet. At the present day great quantities of the pupa of the Silkworm-moth (*B. mori*) are eaten by the Chinese, while the Arab is fond of a repast of roasted locusts; the African considers ants delicate food; and Knox tells us that bees are eaten in Ceylon. Fig. 39 represents the larva of the *Cossus*, which is in length about four inches. It is usually of a dark, but sometimes of a light red on the dorsal surface; beneath, it is of a yellowish hue. The head is black, and the whole creature is sparingly scattered over with fine hairs. It spins a cocoon, wherein to hybernate. At the end of April or beginning of May, the full-grown larva forms a large, tough, oval cocoon (fig. 40), composed of fragments of wood, neatly interwoven with silk, in which it soon changes to the pupal stage. The pupa itself is about two inches in length, of a black colour, provided at the segments with numerous small hooks, by means of which it is enabled to work its way from the interior of the tree. Some lepidopterists recommend searching for the moth during early morning; but long experience has led me to believe that the greater number emerge during the after-part of the day, from about three o'clock till dusk; indeed, it is more natural for the moth to emerge after the tree has been well warmed by the sun's rays, and before it becomes comparatively cold again. Often have I wandered in quest of *Cossi* by the river-side in early morning, where trees infested by them have abounded; but on no occasion have I been successful, unless by taking the pupa from the tree. On the other hand, when I have spent the latter part of the day in hunting for them, I believe I have never been disappointed. Scarcely anything can give more delight to a naturalist than to watch the metamorphosis of this beautiful moth, which may often fall to his lot when seeking the imago. Half the pupa is seen protruding from the trunk, and in this case it should not be disturbed, for the moth is about to emerge. He has not long to wait. The pupa-case is already cracked, and the creature may be seen striving to burst forth into daylight. As soon as the moth is out, it crawls a short distance up the tree, where its wings begin to expand, and a few minutes afterwards it may be seen with the wings folded over its back in the act of drying, which does not occupy many minutes. Then it may be transferred to the cyanide-bottle, which every practical entomologist should always carry with him when on a

Fig. 38. Goat-moth (*Cossus ligniperda.*)

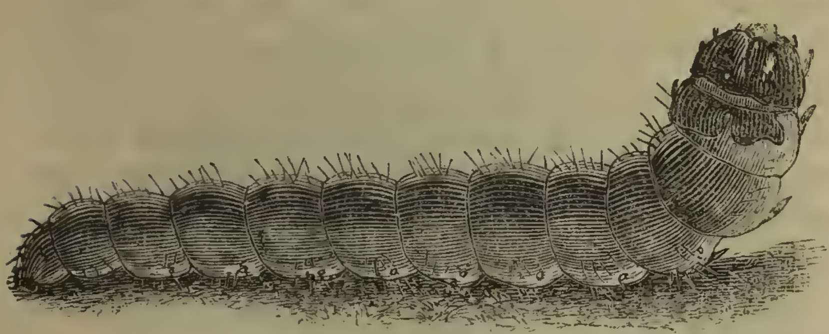

Fig. 39. Larva of Goat-moth.

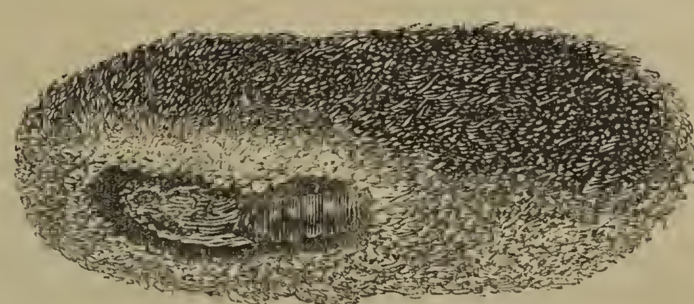

Fig. 40. Pupa of Goat-moth.

hunting expedition. The insects may afterwards be carefully pinned, and placed in the collecting-box.

I advise those who wish to obtain fine specimens for the cabinet to cut the pupa from the tree before the imago makes its appearance, the moth being very liable to become damaged when taken shortly after emergence, unless handled with the utmost care, some little time being requisite for the wings to thoroughly harden. By hunting for the pupæ, any entomologist may during one search obtain enough to satisfy himself, so common are they where the insect occurs. I once found as many as twenty-three pupæ in one tree, and one of the finest willows in this neighbourhood was so infested with them that whenever I visited the tree in the right season, two or three *Cossi* were patiently awaiting my arrival. This moth gives much trouble to entomologists, for it always becomes "greasy," as most internal feeders are wont to do more or less, and in that state is likely to spoil the other specimens with which it is placed. The only way to prevent this is to eviscerate the individual, and to stuff its body with cotton wool; but this requires very great care, otherwise it will not look well. A moth that has become greasy may be cured by steeping it in *benzine collas* for a few hours, and then placing it upon magnesia. By this means much, if not all, of the grease may be extracted; but the moth has never a fine appearance after this operation. We have only this one representative of the genus *Cossus* inhabiting our country, and it is, I believe, almost entirely confined to the southern portion. Although trees suffer very severely when attacked by *Cossi*, they have other enemies of a less destructive calibre; such as the pine-boring *Sirex gigas* and the *scolytus*, with many other larvæ belonging chiefly to the order Coleoptera.

Blackheath. HENRY A. AULD.

SUPPLEMENTARY OBSERVATIONS ON THE SMOOTH NEWT.

HAVING read, with great interest, the two papers by Mr. C. Robson on the Smooth Newt, I should like to add a few remarks as supplementary thereto, if you think they will interest your numerous readers who keep aquaria.

I obtained my newt (a female) in June, 1871, and had it in my aquarium seventeen months. I have seen it cast its skin repeatedly, and may safely say, on an average, about once a week, during the greater portion of that time, and never found any difficulty in obtaining the exuviæ for the cabinet. The method I always adopt to procure the skin, is carefully to note the time when the newt has nearly worked it off to the end of the tail, then to get a thin glass rod, or knitting-needle, and gently touch the naked portion of the tail; the newt, on feeling the unwelcome probe of the inquisitive naturalist, will usually bound forward, and leave the perfect skin beautifully distended in the water. I then carefully remove it into a vessel of clean water, float it on a glass slip, and allow it to dry. (One mounted in the manner above mentioned I herewith enclose.) The skin is of little use as a microscopic object, but is worthy of a place in any cabinet, and is always a *wonderful object* to persons unacquainted with the mysteries of Natural History.

Fig. 41. Male of Smooth Newt.

My newt was equally susceptible to the variations of temperature as the one belonging to Mr. Robson, and generally, before heavy rain, or any great atmospheric change, it would climb up the side of the aquarium, or lie on a piece of wood which I had floating on the water, for hours together, the throat rapidly moving at intervals, to its *seeming* gratification.

Fig. 42. Female of Smooth Newt.

As to feeding it, I never had any trouble; it was always ready for a small piece of raw beef or mutton, which I always gave it in thin, worm-like pieces twice a week; occasionally in summer, giving it a small house-fly. After I had had my newt about fifteen months (with no company but a few small water beetles and snails), a friend sent me out of his aquarium, a male newt, as a companion; the gentleman appeared very well satisfied with his new home and the lady for about three weeks; but he then ungallantly and unceremoniously made his exit, and could not be found again. About six weeks afterwards, the cover of the aquarium being taken off a short time, for some repairs, the lady followed (perhaps) her false one; and although careful and long search was made, almost immediately after her escape, we could never find any trace of her whereabouts.

I am sure any of your readers having an aquarium for microscopic purposes, or otherwise, would find in the newt an endless source of amusement and instruction, and one requiring little, or no trouble, to make the little captive quite at home in, and beneficial to, the freshwater aquarium.

J. M. D. ASHBURY.

HOW TO MAKE A FERNERY.

WE know of no pleasure so agreeable to a true lover of nature as those which include practical botany—the study and cultivation of living plants. Of these, few have received more attention than ferns; and as we have at various times received many applications how to proceed in the construction of a garden fernery, we feel we cannot do better than quote the following from Hooper's "Gardening Guide" for 1873.* In doing so we have also taken advantage of the remarks in the same pamphlet on "Alpineries," a word coined by Mr. Smee in his recent book, "My Garden," which is likely now to be current. Alpine plants are particularly beautiful, and worthy of cultivation:—

Fig. 43. Right way to construct Rock-work for Fernery.

"The desire for a rockery of some kind is now generally evident in most gardens; but, unfortunately, from want of attention to the necessities of the plants, and the manner in which they are found in their native state, it often finds issue in the construction of something, which, albeit it is frequently very costly, is neither suitable to the

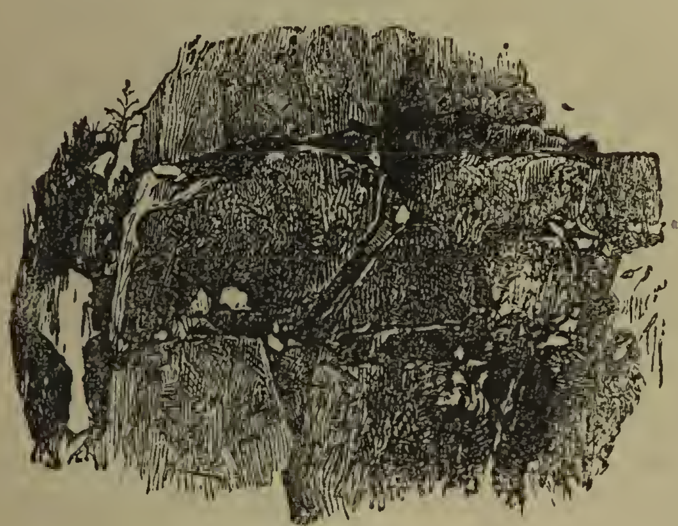

Fig. 44. Wrong way of ditto.

plants nor satisfactory to true taste. In the first place, a heap of stones is not rockwork, neither will plants thrive in dry, dusty soil loosely spread between such, although we have seen numberless cases of the attempt having been made. The stones must be the *second* consideration, and the soil the first, and not *vice versâ*. Once having accepted this fact, the principle of construction will be more or less correct. Rockwork on a large scale should consist of large masses of stone jutting out from hills of soil; on a small scale it may consist rather of a mass of soil covered over more or less with half-embedded stones, burrs, &c.; but in either case, a solid mass of stone is a *sine quâ non* as a foundation. Roots of trees are also suitable, as well as stony materials, more especially, however, when the construction is for a fernery than for an

Fig. 45. Cave over water in an existing Fernery—planted with *Struthiopteris Germanica*, *Scolopendrium crispum*, *Asplenium trichomanes*, *A. marinum*, &c.—with water plants below.

alpinery. They have, however, this objection, that they fall into decay, and also (if it can be considered an objection) produce fungi, though, for our own part, we consider a few of these in a *fernery* an additional charm. As the rustic appearance of roots is very suitable amongst ferns, we confess to have a liking for the moderate use of them. The recent introduction of cork bark for this purpose, however, must not be omitted from our list of materials for rockwork-making. It has many advantages, not the least of which is the fact that it is simply a soil-coverer, and does not rob the plants of any space in which to grow. It requires securely fixing by means of struts of wood, &c., thrust into the soil, to the end of which the cork is strongly nailed. 'Tufa,' also, must not be overlooked; it is a very porous petrifaction, and in every way very much to be recommended. Whatever is used to construct the rockery, be careful to keep in view

* Hooper & Co., Covent Garden, who have kindly granted the use of illustrations, which were first prepared for "Alpine Flowers for English Gardens," by W. Robinson, F.L.S.

these primary necessities. First, that the whole body of soil must be contiguous, and no part of it detached from the rest; that is to say, no pockets of soil on the surface to receive plants must be disconnected from the bulk; and secondly, place the facing material in such a manner that no piece overhangs so as to keep the rain off any portion, but the reverse, allowing every plant and the portion of soil in which it grows to have the direct benefit of the showers. [See accompanying sketches, figs. 43, 44, 45.]

"It now remains in this brief essay just to indicate the positions and soils for the foregoing structures ere we pass on to another subject.

Fig. 46. Alpine Plants bordering a shrubbery.

"A fernery must be in the *shade*. Hosts of ferns will *grow* in the sun, but *none* will look really nice there. Select, therefore, a well-shaded spot for a fernery, and, if necessary, sink the ground-level a little, throwing up the soil on the banks; this will give further seclusion, shade, and moisture to a spot where these elements are so in character. The garden walks may be constructed to decline gently into this lower level, and the variation will generally be found a pleasant one.

"Though a shady spot is necessary for a fernery, a *well-drained* one is also indispensable; and this must be well borne in mind, especially for the rock species, which cannot endure stagnant water about their roots; a properly-constructed bank, however, will generally secure good drainage from its form and position. The best main soil for a fernery is good yellow loam: the greater number of hardy ferns do well in this; some, however, like peat. Perhaps the perfection of fernery soil is two parts loam and one part peat. The latter can be in greater quantity when those kinds are planted that prefer it. By no means use fine, sifted soil, but always more or less lumpy, and let it be very solid and firm between the masses of stone, &c., that there may be no shrinking away from the roots after planting. If the fernery is small, one irregular bank is preferable to a great many ins and outs and details; but if space is abundant, the work may be more intricate, and a good many aspects and degrees of declivity may be provided, thereby meeting the necessities of a great variety of species. To produce that luxuriance of growth which is such a charm to ferns, a daily syringing with water overhead is necessary during summer. It may be worth while to mention that ferns are plants that bear frequent moving badly, as will be proved in the experience of the cultivator, from the much better appearance they present after being several years in one place.

"An Alpinery requires a position the reverse of that selected for ferns. Instead of seeking the shady, sequestered spot overarched with leafy trees, scarcely any situation can be too open or exposed for this. The full blaze of the noonday sun, which would in a couple of hours blast the beauty of the rich, feathery fronds of the Athyriums, or wither into tinder the exquisite greenness of the tender Oak Fern, would draw out the rich blossoms of a host of gems amongst the Alpines, and light up their charming hues with their true lustre. The love of sunshine, and the need of it, too, is almost universal in this class of plants; and the position selected cannot, therefore, be too much exposed to it. But this is not the only side of the question, although it is where many cultivators have stopped short, to their ultimate discomfiture and disappointment. If Alpines need sun, they also need moisture 'behind the scenes,' and many a good collection has been lost through the want of a proper arrangement securing this.

"In their natural habitat, the brilliant sunshine which calls forth into rich blossom their hitherto dormant buds, at the same time melts the snow which has surrounded them, and this winter-stored water thus gradually let loose, percolating perpetually between the masses of rock whereon they grow, keeps a constant supply of water at their roots, ever changing, never stagnant, and thus maintains that luxuriance of growth which otherwise appears difficult to account for in the face of the apparent dryness visible on the surface. It may surprise some, perhaps, to learn that many of the diminutive plants of this class, which scarcely raise their spreading leafage two inches above the surface, strike their tiny roots many *feet* in depth

between the boulders, into the moist soil beneath. Thus it is evident that even more here than amongst the ferns, large bodies of soil are indispensable, and every portion on the surface connected with the *whole mass*. The principles enunciated for constructing rockwork above will hold good here. Let the stones or burrs be of a good size; and, for the sake of good taste, avoid the use of such additions as *artificial* adornments — shells, or such-like. Whilst recommending a position exposed to the full sun, we do not say that rockeries cannot succeed in half-shaded ones; on the contrary, whilst, as a general rule, the foregoing remarks are correct for true Alpines, plants can be found in abundance to furnish rockwork in any position whatever. A good use for many of the stronger-growing kinds is as borders to shrubberies [see fig. 46]. The soil for the great bulk of Alpine and rock plants should be sandy loam and grit. There are some species which require peat, but these form a separate section, and should be cultivated together. The first-named soil is that most generally requisite, and suits all the large families of Sedums, Saxifrages, Sempervivums, and many other species of great beauty and easy culture."

MICROSCOPY.

Dark Lines in Field of View.—I have a large binocular microscope whose eye-pieces are 1⅜ inch diameter, by which instrument I can view objects perfectly stereoscopically with the 3, 2, and 1-inch objectives, and get an equally illuminated field of view in each eye-piece; but when I use the binocular with a ¼-inch objective of 80°, I get a dark line across the field, and, on looking into each eye-piece separately, I find them only half-illuminated, viz. the inner half, the outer half of each being perfectly dark. Will some correspondent kindly say if this ought to be, or whether I ought to get each field wholly illuminated when using so high a power? My objectives are all English make. I have no power between the 1-inch and ¼-inch, so cannot say how the instrument would behave with such.—*G. W.*

Pollen of Petasites fragrans.—Though this is not a British plant, as it was originally introduced to England from Italy in 1806, it is doubtful whether any of our indigenous species abound so much and so early in pollen as *P. fragrans*, or Sweet-scented Butterbur. It grows rampant at Canterbury in deserted gardens, where this Butterbur has been profusely in bloom from Christmas up to the present date (Jan. 13). And the pollen-grains are so remarkably beautiful as to afford very delightful microscopic objects even at this dreary season. Each pollen-grain is oval, having a length of $\frac{1}{500}$ of an inch, and a breadth of $\frac{1}{700}$; muricated on the surface, like those of so many other compositæ; becoming globular or sub-triangular, with three scars appearing for the passage of the future pollen-tubes, when treated with diluted sulphuric acid. The pollen-grains are so large that they may be very easily examined under an object-glass of half an inch focus.—*Q. F.*

Mounting in Soft Balsam.—Mr. F. Kitton, in the December Gossip, regrets that directions should still require to be given for mounting in soft balsam, and, whilst I cannot but equally regret that the beginner in mounting should find himself, confronted with an array of spring clips, spirit-lamps, and cautions about over-heating his balsam, when there is not the slightest necessity for any of them, I am of course aware that every mounter has his pet method, and that constant practice will make him perfect in its use; but to the beginner, the number of appliances and cautions are appalling, and often deter him from making the attempt. For many years I have used soft balsam only, and have never known one of my preparations to change its position on the slide, whilst any of them may be readily rubbed with a chamois skin between thumb and finger, without sustaining any injury, which Mr. Kitton claims as an attribute of the hard balsam slides. The following directions, if carefully followed, will invariably result in success:—Select the finest Canada balsam and slowly evaporate it, until upon cooling it assumes a brittle resinous consistency. Break the mass into small pieces, and dissolve them in chemically pure benzole, until a saturated solution about the consistency of rich cream is formed. The specimen to be mounted having been previously freed from moisture by drying, or by being passed through weak and absolute alcohol (the latter being by far the preferable method), is finally to be placed in oil of cloves, and carried from the latter to the slide, where, after being properly arranged with needles, a drop of the balsam is placed upon it, followed by a core in the usual manner, and the whole laid aside to harden, which will be accomplished in a few days. This will be facilitated, if, after the lapse of twenty-four hours, the slide be slightly warmed, the core pressed carefully down with the forceps, and a small weight laid upon it. The best finish for the edge of the circle I have found to be made with a camel-hair pencil dipped in the same balsam that is used in mounting. It makes a very neat and handsome finish, with of course no tendency to run in and spoil the specimen, as is the case with all coloured cements used for this purpose. The oil of cloves is preferable to turpentine for mounting from, since it is more readily miscible with the balsam, and does not harden the specimens, which may be left in it for a long while unchanged. I send you by

this mail three specimens, prepared exactly as the above directions, that you may judge of the results. None of them were dried, and none have been mounted over thirty days, but you can clean them as much as you please without displacing the cover. [The specimens are admirable samples of mountings.—Ed.]—*W. H. Walmsley, Philadelphia, U. S.*

Bunt of Wheat as a Lens.—(Translation). I thank your correspondent "F. W. M." for his courtesy in replying to my query, and shall be glad to avail myself of his offer to send me a slide or two of the preparations showing the multiplied images. I had already tried the experiment of placing the object between the stage and the source of illumination, but had failed in obtaining the desired results. May I ask him, in employing the $\frac{1}{4}$-inch objective, at what distance I should place the object which I wish to see multiplied in the eyes of the beetle?—*A. M., Rochefort-sur-Mer.*

How to pick out Diatoms in Mounting.—The *Monthly Microscopical Journal* for February contains a good abstract of a paper in the *Lens*, by Dr. C. Johnson, on this subject. The latter says that nothing is easier than to seize particular diatoms and transfer them to a bottle for future use, or to a slide, provided the field from which we select be rich and clean. Difficulty, however, occurs when forms in any gathering are few and far between. Let such prepared material be spread upon a large slide, covering a space of one inch by two, and let it be filliped as it is set away to dry spontaneously. With a two-thirds objective, search the white field for any object whatever, and, upon finding, encircle each one with a line, made with the point of a match sharpened and moistened, adding near the circle a dot, or cross, or other sign, always appropriated to the same diatom, and of which a tallying record is kept on paper. At leisure one may, without trouble, single out any desired object, pick it off with a fine dampened point of cane (reed), not including the siliceous cuticle, and deposit it free from injury, in a small drop of distilled water placed in the centre of the slide.

ZOOLOGY.

New Societies.—We are always glad to notice the foundation of new clubs or societies for natural history pursuits, regarding them as the most practical illustrations of the extension of science. The Kensington Entomological Society is one of the latest, and is fortunate in having for its president such a well-known writer and naturalist as Alex. Murray, F.L.S. The names of the committee and hon. secretaries are all of them guarantees for good work. Among other things, we have just received the first report of the Birmingham School Natural History Society for 1873. It is exceedingly modest in its pretensions, but we are disposed to allow it more importance than it claims, as institutions like these, in disposing the minds of clever boys towards natural science, must do an amount of good that cannot be easily estimated. The president of the society is the head master, the Rev. A. R. Vardy, who is ably supported by his assistant masters and a committee of the school-boys. The society is divided into three sections, for the relative study of botany, entomology, and geology. Several excursions were made last year in pursuit of these sciences, which appear to have been very successful. The report also contains summaries of the principal papers read last year by the members. We cordially wish this unpretending society success, and that its example may speedily be followed by other public schools.

East Kent Natural History Society.—Our readers will have been prepared by the various extracts we have given in our columns from time to time of the proceedings of this society, to give it credit for standing in the front rank of its hard-working provincial brethren. The fourteenth Annual Report, just issued, fully bears out this idea, and shows the society to be in a most flourishing condition in every respect. A sub-committee had been formed to work out the Flora of East Kent, but we are sorry to find that its work was suspended during last year. The part taken in the proceedings by Dr. Gulliver, Colonel Horsley, and Mr. Fullagar was very important. The latter gentleman's researches on the economy of the Hydra, originally communicated to the society, have already appeared in this journal.

Brighton and Sussex Natural History Society.—The nineteenth Report of this society shows it to be in a more prosperous condition than ever. It has the advantage over many local societies of including members whose names are well known to science generally. The most interesting meetings, however, appear to be those devoted to Microscopy. Evenings for the special exhibition of specimens are another feature which provincial societies elsewhere would do well to copy. Among the papers read, and of which abstracts are given, are those by Dr. Stevens, on "Flint Works at Cissbury;" Mr. J. Robertson, on "Sepiola oceanica," &c.; Dr. Stevens, on the late "Discovery of Pit-dwellings in Hampshire;" Mr. F. H. Hannah, on "The Palates of Mollusks;" Dr. Hallifax, on "Certain Facts in the Anatomy of the Cuttle-fish;" Mr. Mitten, on the "Distribution of Flowering Plants in the Vicinity of Brighton;" Mr. G. Scott (President), on the "Suffolk Tertiaries;" Mr. Hennah, on "Minute Crustaceans;" Mr. B. Lomax, on the "Colours of Plants," &c.—a good account, as will be seen, of a year's useful work!

Amalgamation of North London Societies.—Mr. G. R. Redgrave has communicated to us a plan which we willingly lay before our readers, as it promises to affect such as are placed within the district it immediately concerns. He proposes to amalgamate all the natural history societies in North London, into one, to be located in the Alexandra Palace, of which Mr. Redgrave is manager. The company are willing to provide a room for the meetings, and all necessary accommodation for the exhibition of collections, &c. Mr. Redgrave expresses his desire to receive any suggestions, addressed to him at the Palace, with reference to this proposed amalgamation. There can be no doubt as to the benefits which the realization of such a scheme would confer on students, and we accordingly lay it before our readers to court such attention as it may be deemed worthy of.

The Camberwell Beauty in January.—A note reaches us from Norfolk of the occurrence of a living, but torpid, specimen of the Camberwell Beauty at North Creake, on the 6th of January last. It fell from some trees upon a lady's hat, and was thus captured.

The Light at the Bottom of the Sea.—An ingenious plan has been adopted by Professor Agassiz's expedition for determining how far the submarine regions are pervious to light. A plate prepared for photographic purposes is inclosed in a case so contrived as to be covered by a revolving lid in the space of forty minutes. The apparatus is sunk to the required depth, and at the expiration of the period stated is drawn up and developed in the ordinary way. It is said that evidence has thus been obtained of the operation of the actinic rays at much greater depths than hitherto supposed possible.

Voice of Fishes.—At a late meeting of the Académie des Sciences, M. Charles Robin read a report on the production of voice in certain fishes. The swimming-bladder appears to be the principal agent in producing voice, at least in those fishes in which that organ has an opening into the œsophagus; and even in those in which it is a shut sac it acts as a sounding-board in augmenting the sound produced by other parts. That it is not exclusively the cause of vocal sounds is shown by the circumstance that some fish are destitute of a swimming-bladder, and are yet capable of producing distinct musical sounds.

Rare Fresh-water Shells.—Perhaps some of the readers of Science Gossip who are collectors of British fresh-water shells may be glad to have the following note as to the exact locality of two rare shells, *Amphipeplea glutinosa* and *A. involuta* of Gray's Turton. The note I owe to Mr. R. Gibbs, formerly fossil-collector to the Geological Survey, who first collected these two shells in great numbers for Edward Forbes. The locality is Bala Lake, and Mr. Gibbs says, in a letter a few days ago—"It was at the head of the lake next the town that I found them in the weeds, and they look like bits of glue on the bottom, until you take them up in your hand, when they draw in the mantle and expose the shell." The lake, it will be remembered, is situated in East Merionethshire.—*G. A. Lebour, F.G.S.*

New Vultures.—In the February number of *Annals and Magazine of Natural History,* Mr. Sharpe, of the British Museum, describes a new species of Turkey Vulture from the Falkland Islands, under the name of *Catharista Falklandica.* He suggests that an end should be put to the indefinite characters of the genus *Gyps,* of the Old World Vultures, by relegating the two species whose tail-feathers are twelve in number to a separate genus, which he proposes to call *Pseudo-Gyps.*

New British Insects.—Messrs. Douglas and Scott have described, in the February number of the *Entomologists' Monthly Magazine,* two new species of British Hemiptera, under the names of *Athysanus canescens* and *A. cognatus.* A few examples of the former were taken last July among short grass on the Downs at Ventnor, and in August at Birchwood and Sevenoaks, Kent. The latter is rarer, and occurred in Scotland and Devonshire.

BOTANY.

Eastbourne Natural History Society.—Mr. C. J. Muller has read an interesting paper before the Eastbourne Natural History Society on *Geoglossum difforme,* or Earth-tongue, a peculiar fungus, in which the receptacle or fruit-bearing part is club-shaped, the hymenium surrounding the club. He stated that this plant, like many other species of fungi, consists of nothing more than separate threads like the threads of a common mould; and that it differs from a mould only in the nature of its fructification, and the way in which these threads are compacted into an object of definite shape, and considerable consistence. The same remark applies to mushrooms and many other species of fungi, and indicates the vast resources of nature in multiplying forms from one simple element, a delicate tubular filament. Mr. F. C. S. Roper, F.L.S., read, at the same meeting, some notes on the Wall Pellitory (*Parietaria officinalis*), in which he noticed some peculiarities of structure in the leaves, of much interest to the microscopist. If a leaf is placed in water under the microscope, the two kinds of hairs are seen. The most abundant are long, slightly

curved, transparent, and spine-like, with rather blunt points, apparently hollow at the other extremity, and attached to the centre of cells arranged somewhat in a stellate manner, and larger than those forming the general substance of the leaf. Interspersed with these, but less abundant, are small recurved hairs, about one-fifth the length of the others, in shape resembling fish-hooks. They are commonest on the younger leaves. The so-called "pellucid dots" of Loudon, which may be seen on the leaves by holding them up to the light, when the leaves are placed in water and their upper surface examined with a ¼-inch objective, are resolved into seven or eight rather large cells, radiating from the sides of a centre cell, which appears raised slightly above the surface of the leaf, so that the surrounding cells appear to slope away from it. Below these, and in the parenchyma of the leaf itself, is a large single cell, within which is suspended a subglobular or slightly pear-shaped mass with a papillated surface, but with no clearly defined crystalline structure. These bodies are known as Sphæraphides, and have also been called "Crystoliths" by Continental writers; they are sufficiently large and hard to be easily separated from the parenchyma of the leaf when thin sections are made, or small portions torn up under the microscope. When treated with muriatic acid, they dissolve rapidly with considerable ebullition, and when burnt are reduced to a white powder; there can be no doubt that they are, therefore, chiefly composed of lime, and probably in the form of carbonate. They differ from the true raphides, so abundant in many plants, by being almost amorphous, though occasionally a slight semicrystalline appearance may be detected in small fragments if examined with a quarter objective. Although not so often noticed as true raphides, they are characteristic of many tribes of British plants; as the Caryophyllaceæ, Geraniaceæ, Lythraceæ, Chenopodiaceæ, and especially the Urticaceæ; and it is thought by some botanists that they afford a good diagnostic character for species. In some exotic plants these sphæraphides occur of considerable size, forming a weighty grit, and are especially large and fine in the Prickly Pear and others of the Cactus tribe. If we look to the use of this curious and elaborate structure in the leaves of plants, and ask what is its object in the economy of nature, it is a question easier to ask than to answer. Some suppose that raphides are perhaps rather a disease than formations of natural growth in plants; but they are of too common an occurrence and too universally distributed over the whole tissue of certain species for this to be the case. In some instances they are doubtless useful as a medicine, and the genuineness of sarsaparilla, guaiacum, and squills may be tested by the presence or absence of raphides. It is probable, as Dr. Gulliver suggests, that the large proportion of these crystalline bodies, being compounded of phosphate or oxalate of lime or some other compound of this earth, and remembering the value of these substances in the growth and nutrition of plants, that nature has established in some plants a storehouse or laboratory of such calcareous salts, and that we may thus get a glimspe of the utility of these crystals.

Chemical Processes in Plants.—Professor Emmerling has lately, with the object of extending the slight knowledge we possess of the chemical processes which occur in plants, set himself the task of ascertaining the action of the plant-acids (oxalic, tartaric, malic, &c.) on those mineral salts which are of importance in the nourishment of plants. To this end he has examined, in the first instance, the behaviour of oxalic acid towards the nitrates of calcium, potassium, and sodium; having chosen this case, because there is no doubt that plants in general take up nitrates from the soil, and because it is equally certain that oxalic acid is present in most plants. The action between solutions of oxalic acid and calcium nitrate was determined under all possible conditions, regard being paid to the influence of time, of concentration, of an excess of the one or the other reagent, and of the presence of other salts. The reaction consists in the separation of crystalline calcium oxalate and of free nitric acid. The amount of oxalate precipitated depends on the conditions of experiment; it is less the greater the dilution and the shorter the time of action. Even when highly dilute solutions are employed, however, the amount of precipitate is very considerable, and if the action be continued sufficiently long, almost complete precipitation is effected, the formation of a precipitate ceasing to take place only when the solutions are enormously diluted. The separation of oxalate is not only increased by an excess of calcium nitrate, but also by an excess of oxalic acid: nitric acid has a contrary action. From these results the author concludes that the plant-juices *necessarily contain free nitric acid.* With regard to the crystalline form which the deposited calcium oxalate takes, he finds that it is exactly that which is of most common occurrence in plants; the crystals separate in monoclinic prisms of the orthoclase form, possessing an extraordinary tendency to form twins, and frequently united in aggregates, such as are often met with in plants, and known as "morning stars." Raphides were not observed. By applying the method of diffusion, M. Emmerling has also succeeded in establishing the fact, that the nitrates of the akalics are partially decomposed by oxalic acid in very dilute solution, with separation of free nitric acid. Although, in his estimation, there is no doubt of the separation of nitric acid in the plant, he does not believe that it long remains present as such, but that it is probably further converted by reduction into ammonia or hydroxy-

lamine, which in turn takes part in the formation of organic nitrogen compounds.

Vegetable Parasites on Bread.—In a paper just published in the *Comptes Rendus*, Messrs. Rochard and Legros state that the mouldiness which is frequently developed in bread does not result from the presence of certain germs in the atmosphere, but occurs when the bread is badly made from inferior flour, and kept under wrong conditions. Of the orange-coloured cryptogams observed, the *Oïdium aurantiacum* was not nearly so abundant as the *Thamnidium*, the latter being one form of *Mucor mucedo*. The green spots are produced, sometimes by *Aspergillus glaucus*, and sometimes by *Penicilium glaucum;* the black spots by *Rhisopus nigricans;* the white spots by *Mucor mucedo*, and sometimes there is also *Botrytis grisea*. It is stated that excess of salt added to the bread prevents the production of these parasitic fungi.

"Recent Records of Rare Plants."—Mr. F. Arnold Lees, who writes on the above subject in a recent Science-Gossip, will be glad to know that there is little danger at present of *Helianthemum Breweri* becoming extinct on Holyhead mountain. In the autumn of 1871 it was very abundant near the North Hack. The plants varied much in height. Some of those on the dry parts of the mountain did not exceed an inch, while a few in damp, sheltered situations measured over a foot. I saw *Cineraria maritima* growing sparingly not very far from the town of Holyhead in 1869. I can confirm Mr. Lees', statement that *Potentilla rupestris* and *Lychnis viscaria* still exist on Craig Breidden, and I think (thanks to the precipitous cliffs) they are pretty safe. *Veronica spicata* (var. *hybrida*) also grows on this hill.—*George R. Jebbs.*

Petasites fragrans as Bee Provender.—At a recent meeting of the East Kent Natural History Society, referring to the Sweet-scented Butterbur, now growing and blooming so abundantly near the Cathedral, the Hon. Secretary, Dr. Gulliver, produced further specimens of this plant in order to show its true sexual character, and that this is not in conformity with the current descriptions. Every botanist knows that *Petasites* is diœcious or subdiœcious, or at least that this genus is so described by all the highest authorities; for example, Lindley says that its "flower-heads are diœcious," and Babington that these "heads are many-flowered and subdiœcious." But, on the contrary, the Canterbury plant is confined entirely to the hermaphrodite form, each of the flower-heads being throughout composed of perfect, regular, five-cleft, tubular florets, save a few smaller shortly ligulate and female ones at the circumference of the flower-head. Hence it would be interesting to examine the sexual forms of this plant in other localities. Of the above-named plant the pollen is white, and so abundant as to have been shed from the gathered specimens, like flour sprinkled on the paper over which they were laid in January; and so fully exposed on the exserted stamens, and still more exserted styles, of the tubular florets of the growing plants, as to invite insects. Thus bees, tempted out by a genial day in the winter, might find a rich table, even in December, January, and February, when other food was either scarce or absent. And seeing this early profusion of the pollen of the multitudinous flowers, the fragrancy, the hardiness, and perennial luxuriant growth of this Italian Butterbur, even in shady and damp places, it should be so highly valuable as earliest provender for bees as to be better worth cultivation in England for this purpose than any other plant. Our native *Petasites vulgaris* is well known to be grateful to bees; but it is less sweet-scented, is later in flowering, and requires a wetter situation than *Petasites fragrans*. The pollen-grains have each three scars, are prickly on the surface, like those of most other *Compositæ*, and of an oval shape, the length being about 1-400th of an inch, and the breadth 1-700th. Indeed, the pollen is just such a beautiful object, and so easily examined, as may engage the attention of, and serve as a whetter to, the novice in micrographic botany and the inquiries of the scientific bee-master.

GEOLOGY.

An Ancient Cheshire Forest.—About half a mile to the west of Warrington is a large tract of land which is in most parts, during ten months out of the twelve, covered with water. Formerly a brook ran through this swampy land, and emptied itself into the river Mersey at a point called "Poo Mouth." The Great Northern Railway Company, in connection with the Lincolnshire and Sheffield Railway Company, in their survey for a new line from Manchester to Liverpool, crossed this valley. The line passes at this point over a strong viaduct, and it was in the excavations to find a good foundation for the piers of the arches that the remains of an old forest were met with. It was necessary to go to a great depth to arrive at solid rock. The section thus exposed was as follows; viz., Lacustrine accumulations, consisting of silt, surface-washing from the neighbourhood of St. Helen's downward, &c., 5 ft. 6 in.; black soil, with bands of sand, remains of furze, &c., 2 ft. 6 in.; white sand, 1 ft. Ancient forest, consisting of oak, hazel, alder, and fir, the two former predominating. The stumps were dug out in the position in which they grew, and several of the branches, when newly excavated, presented the appearance of having been cut with a sharp instrument. Cones, &c.,

18 ft. At the depth of 25 ft., an innumerable quantity of hazel nuts, when they had become perfectly dry, were quite hard, the oak resembling bog oak. A large quantity of bones, consisting of shoulder-blades of the smaller animals, shin-bones, and vertebræ, besides many others, both perfect and in fragments, were brought to light. A bear's skull was found amongst the rest. At a distance of about half a mile, in almost a direct line with the viaduct, while making a cutting through which the line of rail was to pass, a number of small marine shells, both fragmentary and entire, were found. No doubt, had it been known that such objects would have been discovered, greater care would have been taken to collect them whole. As it was, the greater part fell into the hands of the workmen, and were either scattered or destroyed.—*P. S.*

Glacial Drifts of North London.—Such was the title of a paper read before the Geologists' Association by Mr. Henry Walker, F.G.S., and reprinted. It describes a recent exposure of the glacial drift at Finchley, and gives details of the section, chiefly remarkable for the quantity of re-deposited fossils from older formations, especially chalk and lias, found there. The beds Mr. Walker believes to be middle and upper glacial. The drift beds lie, at Finchley Station, at a height of 390 feet above the ordnance datum-line. Mr. Walker gives a very useful list of the places in the neighbourhood where geologists may see the chalky nature of the Middlesex boulder clay.

Secondary Strata in Scotland.—A valuable paper has recently been read before the Geological Society, on the Secondary Rocks of Scotland, by Mr. J. W. Judd, F.G.S. He states that these rocks are represented only by a number of isolated patches of strata situated in the Highlands and Western Isles, which have been preserved from the destructive effects of denudation either through having been let down by great faults among the Palæozoic rocks, or through being sealed up under vast masses of Tertiary lavas. The Cretaceous rocks, yielding a beautiful series of fossils, were discovered by Mr. Judd last summer on the mainland, and in several of the islands of the West of Scotland. The Oolitic rocks were shown to present marked contrasts with the English series, in being constituted, throughout their whole thickness, by alternation of marine and estuarine series of beds, in which respect they precisely resemble the Oolitic rocks of Sweden. The rocks of Sutherland, in which the *Telerpeton* was discovered, are now proved to be of Triassic age, as Prof. Huxley conjectured.

The Upper Cambrian Rocks.—Dr. Hicks has made another important communication to the Geological Society of London, on the Tremadoc rocks in the neighbourhood of St. David's, South Wales. Many of the fossils mentioned by him as being recently discovered, are new species, and some of them even new genera. Among the latter is a Trilobite, named *Neseuretus*, among the former; species of *Theca*, *Bellerophon*, *Palasterina*, *Dendocrinus*, &c., all of them highly organized forms. Perhaps the most marked feature is the discovery of species of *Lamellibranchiata* in the Upper Cambrian rocks. Until now, they were restricted to strata of later age.

Polishing Stones, &c.—I have much pleasure in giving "S. W.," who asks (in Science-Gossip, Jan., p. 9) for information on this subject, the mode I have for some years adopted with great success for polishing agates, amber, coprolites, carnelians, jet, malachite, marble, mother-o'-pearl, and many other stones. First, to grind:—Get a piece of thick sheet lead, about nine inches long by four inches wide. Also a few ounces of emery of the three last degrees of fineness, and using the coarser kind first, rub down the agate, &c., with the aid of a little water, on the lead. Having thus reduced the agate to the size and shape required, the next best thing, though not absolutely necessary, is to rub the surface with a piece of snake-stone, keeping it moistened the while with a little water. Small and suitable pieces of snake-stone, with one side beautifully smooth, can readily be obtained at any marble or stone mason's for a few pence. Secondly, to polish:—Get a piece of half-inch deal, about eighteen inches long by six inches wide, and nail tightly over it three thicknesses of cloth, the finer the better for the upper piece. Strew some putty powder over this; wet it with water, then rub the stone on it briskly till the polish is effected. After this, if you want a very first-rate polish, for which the extra trouble amply repays itself, make another board similar to the first, using jeweller's rouge instead of the putty powder; but in all cases the putty powder should be used first.—*L. V. H.*

NOTES AND QUERIES.

The Hydra.—In an article on the hydra in the January number of Science-Gossip, the author gives it as his opinion that the hydra does really possess the power of paralyzing or stinging its prey, and instances his having seen water-fleas that had come in contact with its tentacles, but had managed to disengage themselves, drop down lifeless. I remember Mr. Lewis, in one of his books, states that he had watched those animals that had apparently been stung by the hydra, and found that after lying at the bottom a short time, they swam away apparently nothing the worse; and also that he found that when they were touched by a needle they behaved in exactly the same manner. Is not this a proof that they were merely shamming death; unless Mr. Fullagar believes that the needle possesses the same paralyzing power as the hydra? I have myself, during several years, performed

numerous experiments with anemones, but could never find that they possessed any powers either of stinging the human subject or of benumbing their prey.—*John Harvie.*

"Beech-trees and Lightning."—I have seen several beech-trees that have been split and injured by electricity. A few days since (in January, 1873), I found a large beech-tree in Wiltshire, with all its leaves on; they were yellow, shrivelled-looking things; they crumbled under the finger; the tree was not dead, but the woodman who was with me said that it had been struck by lightning in August last, while in full leaf, with this extraordinary result, that the foliage had not fallen in midwinter. As the tree was not expected to survive, it was marked for felling. No other tree near was affected.—*H. P. M.*

"Honey Dew."—In reference to this subject, in February number—Is not this substance deposited by the aphides? Within a few hours after its appearance on a leaf, thousands of young aphides can be seen on it, and in the course of a day several generations seem to come and go, leaving their little carcasses clinging to the glutinous moisture. If it is not the egg-containing matter, what is it?—*H. P. M.*

Stings of Wasps.—E. T. Scott, remarking on this subject in the February number of Science-Gossip, asks, if the tube in a wasp's sting is for the purpose of conveying poison? Will you allow me to inform him, that it does convey a liquid, which I presume to be the cause of irritation in the sting-wound. On examining a sting, cut off with its bag attached, through a globular magnifying glass, made by the curator of the Chester Museum, I found that, under strong sun-light, the sting became transparent, with a bright scarlet line running through the centre. This line was caused by a liquid, which discharged through one or more orifices, on or about the point of the sting. On pressing the bag, the supply in the tube of the sting was replenished; the pressure on the sting can be made with the back of a knife, and the bag can be manipulated with tweezers. The colours of the sting, and of the liquid, are very beautiful, quite repaying examination.—*H. P. Malet.*

Interference of Light.—Your correspondent Horace Wilson will find an elucidation of the phenomenon, so clearly and interestingly described, in a paper by Sir George Hervey on the "Colour of the Aërial Blue," published in *Good Words* for August, 1870.—*George S. Gibbs, F.S.S.*

Skeletons of Animals.—I wish to make a collection of the skeletons of different animals, &c., and wish to know if you could inform me of the way in which this could best be done in order to obtain a perfect skeleton.—*T. A. R.*

The Queen Bee.—Having very often handled the queen bees, I can speak from experience that there is nothing to fear from their stings; I never knew her majesty make any attempt to vindicate her outraged dignity; but if an experimentalist has acquired sufficient skill to find and capture a queen, he must be sufficiently hardened to have but little fear of a bee-sting. The late Mr. Woodbury, of Exeter, who wrote under the *nom de plume* of "A Devonshire Beekeeper," has often described the combats of queens, and how one queen *stung* the other; Mr. Woodbury was a most accurate and painstaking observer, and his observations have been confirmed by others, so that I cannot now receive the new opinion that the queen cannot do what has been so often described as done, unless the observations of Major Munn should be confirmed by others. The queen bee, when handled, makes no attempt to fly; she runs about pretty quickly, and probably would eventually take wing, but certainly shows an indisposition to do so, although, we all know, she has no inability.—*John Hunter.*

Rare Plants.—For the information of Mr. F. Arnold Lees, I write to say that I have a note of having seen *Spiranthes æstivalis* at its station near Lyndhurst in 1857. On the 22nd of June, 1872, I saw *Simethis bicolor* at its station near Branksome Tower, Dorset, in flower, and in tolerable abundance. No care seems to be taken to preserve the plant undisturbed, and I fear that planting, of which I saw indications, will before very long "improve" it away. On the 18th o June, 1872, I saw *Phalaris paradoxa* growing abundantly amongst wheat and oats in the same spot in which I noticed it for the first time in England in 1847. In the extreme south-east of Dorsetshire five plants, all of a southern type, are to be met with; namely, *Phalaris paradoxa*, *Briza minor*, *Cynodon dactylon*, *Cyperus longus*, and *Simethis bicolor*.—*James Hussey, Salisbury.*

Diatoms.—Can any reader inform me how the slides of diatoms arranged in patterns are prepared? If arranged all right, they always wash away when the balsam is applied in my hands. I suppose the same process would also do for Foraminifera.—*C. L. Jackson.*

Luminous Fungi.—The following account of this phenomenon may perhaps be interesting to some readers of Science-Gossip. "I noticed a very singular luminous appearance a little while back. Passing through the cemetery, I saw a light on a post, which at first I took for a glow-worm; but on nearing it, found that it was of a peculiar zigzag shape. From what it proceeded I could not make out; and having heard that putrefying substances emit a light, I did not care to handle it. On examining the post in the morning, I discovered a fungus, the upper edge of which was about the same figure as the light I saw. Whether this gave out the light or not I do not know, as it has never appeared since."—*Joseph Anderson, Jun.*

Courage and Sagacity of Swallows.—Some months since, when in the yard of a brewery belonging to a friend, my notice was attracted by the screaming of a pair of swallows which had built a nest and had young ones under an archway. I observed them making rapid swoopings at a cat in the yard, which for some little time struck at them with her paws; but finding this of no avail she became frightened, and at every swoop made by the swallows, bobbed her head in a most ludicrous manner. I took her up, and placed her immediately under the nest, which she could not possibly get at. The birds then became very daring, and were reinforced by another couple. The quartette then so persecuted pussy that she was fain to take refuge between my feet, crouching there in fright. There the swallows actually attacked her, coming within half a foot of my legs.—*G. J. L. Lamarque, Dover.*

The Gold-tail Moth.—I have never experienced the irritating effects attributed to the

caterpillar of this moth, but have a most vivid and disagreeable recollection of having handled the cocoons of the Vapourer (*Orgyia antiqua*), and thereby encircled my neck with a ring of terribly-itching blisters, which became worse the harder they were rubbed. I had, after handling the cocoons, incautiously raised my hand to my neck, and the fingers being coated with the hairs caused the mischief. I think there is but little doubt that the effect is produced by the hairs. Have the latter ever been microscopically examined, and if so, do they present any difference in structure from ordinary hairs?—*W. H. Warner, Kingston.*

Erratum.—The heading of my little article on p. 33 should have been "A Nut-storing Bird," instead of "A Nut-stowing Bird."—*W. H. W.*

White Sparrow.—A white variety of the common House Sparrow (*Passer domesticus*) was shot last November in this neighbourhood, but was too much damaged for preservation. A remarkable variety of the Robin (*Erythaca rubecula*) was brought to me some years back, in which the tail and the greater part of the wings was of a buff or cream colour. I have also seen a starling (*Sturnus vulgaris*) which had been shot in Berkshire, which had the head and neck, the wings and tail of the usual starling colour, but the rest of the plumage was cream-coloured.—*W. H. Warner, Kingston.*

Ophrys apifera in Herts.—There is another station for *O. apifera* in the neighbourhood of Welwyn of a very similar character to Mr. Blow's. It occurred a few years back in some plenty on the bank which separates the Great Northern Railway from the high road to London, immediately to the south of Hatfield. This is on made ground, the road and railway running side by side in parallel cuttings, and the dividing ridge on which the plant occurs having been, in addition, artificially raised to shut out the trains. There is a record for the Bee Orchis at Hatfield in Gerarde (quoted in "Flora, Herts"), but I do not know that it has been noticed there since his day, and I have not had an opportunity lately of ascertaining if it still exists. Is not "rare" rather too strong a term for *Ophrys apifera*—in South Britain, of course? There are, too, a good many localities recorded for Herts in the published Flora of that county.—*R. A. Pryor.*

Optics.—The peculiarity noted in "An Optical Query" at p. 20 results from the construction of the seat of vision: it is a defect of sight, one of those "faults" that arise in the very nature of things. We have no perception of light at the point where the optic nerve enters the *choroid*, a membrane that lines the eye internally, the coat being perforated or deficient at the point of junction. This is shown by a common experiment. "If two discs of white paper be fixed upon a wall at the distance of two feet apart, and the observer with the left eye closed gazes attentively at the left-hand disc, slowly retreating, he will for a time continue to see them both . . . when he has reached a distance of about eighty inches from the wall, the right-hand object will suddenly disappear . . . till he has gained the distance of about one hundred inches. During this period the spectrum has been passing over the circular aperture in the *choroid* through which the nerve enters."—Abridged from the *Penny Cyclop.*, vol. x. p. 144. The case of "Interference of Light," cited at p. 20, is very analogous to the polarization of light shown in the blue colour of the sky. This is the law of *interference.* "If two minute pencils of light, radiating from two different luminous objects, meet at the same point, equally distant from the luminous objects, a greater intensity of light is produced than by either pencil singly; also, if the length of one of the rays exceeds that of the other by some certain difference, or by some multiple of that difference, the intensity of the light thrown on the point of junction is similarly augmented. But if one ray is longer than the other, only to the amount of half that difference, or some multiple of the half, the two pencils will destroy each other, and a black spot or fringe will be produced. The *difference* of length required by the different coloured rays is different. This mutual action of the rays, increasing each other in one case, and destroying each other in the other case, is termed 'interference.'" —From Maunder and Johnson's *Scientific Treasury*, p. 382. Professor Tyndall considers the blue light of the sky to be due to reflected light. "Let the beam impinge obliquely upon a plane glass surface, . . the portion reflected will no longer have its particles vibrating in all directions round it. By the act of reflection, *if it occur at the proper angle,** the vibrations are all confined to a single plane, and light thus circumstanced is called *plane polarized light.* A beam of light passing through ordinary glass executes its vibrations . . . exactly as it would do in air, or in ether-filled space."—*Fortnightly Review*, Feb. 1869, p. 239.

* The proper angle is 33°; will that suit the observer's position with referenc to the window?—*A. H.*

The Compass-flower.—The plant inhabiting our Western plains and called the Compass-plant, is *Silphium laciniatum.* It is not, however, a "delicate" plant, as Father Felician says, but a large coarse weed, from three to six feet high, with leaves from twelve to thirty inches long. The lower and root-leaves are vertical, and present their edges approximately north and south, from whence it derives its name of "Compass-plant." At the nineteenth meeting of the American Association for the Advancement of Science, at Troy, N. Y., in August, 1870, Dr. Thomas Hill read a paper on the Compass-plant, a short abstract of which may be found in the *American Naturalist*, vol. iv. 1870-71, p. 495. Dr. Hill states that in a journey from Omaha to Chicago, at three different points, he noticed young plants of the *Silphium laciniatum*, and estimated their bearings at 35°, 75°, and 90°; he afterwards found the true bearings were 31°, 78°, and 90°. Your correspondent will find a discussion of the causes of this polarity in an article by Mr. W. F. Whitney, in the *American Naturalist* for 1871, vol. v. p. 1. The article concludes as follows:—"But the observations here recorded appear to show that the meridional position of the edges of the leaf is to be explained by the structure of the two surfaces, which being identical, at least in the important respect of the number of stomata, seek an equal exposure to the light;—the mean position of equal exposure, in northern latitudes, being that in which the edges are presented north and south, the latter to the maximum, the former to the minimum of illumination."—*Richard Bliss, jun., Cambridge, Mass, U.S.A.*

Spiranthes æstivalis.—I see the fact of *Spiranthes æstivalis* having been found during the last few years questioned in the last issue of

SCIENCE-GOSSIP. I may say that, in company with Mr. Warner, of Winchester, I found it in the well-known locality near Lyndhurst, in September, 1871. It is by no means extinct there. Had we been three weeks earlier, we should no doubt have found more than the three plants we obtained. I may add, also, that we were much pressed for time, and could not continue our search much beyond a quarter of an hour or twenty minutes. We met a Winchester boy, who told us that he was accustomed to obtain the plant for his botanical school-fellows. —*G. S. Streatfield.*

LENSES OF FLIES.—In reply to A. M., Paris (p. 276, 1872), I must first tell him that *no* eye will do so well for his purpose as that of the dragon-fly; indeed, any other does but poorly after it. A. M., Paris, should cut a piece of the cornea off, and clean it. With a little care he will find that it is composed of a number of layers. Some of these he may take off, if he likes. I have taken off six, at least; but I don't think it matters, except as a curiosity. Having cleaned the cornea, he must mount it without any preparation to it; but mind that the outside of the cornea is next to his lenses. He may then try it. As a common object, focus it to the hexagons. Hold any object between the mirror and the eye, and very slowly move the power further from the eye. The hexagons will disappear and look roundish, and in each he will see a beautiful image of whatever object he is holding under the eye. Tilt the microscope nearly horizontal, and proceed without, or with, the mirror, as is suitable, and a person, the trees, or other objects will be seen. By arranging it properly, he may view butterflies' scales magnified.—*E. T. Scott.*

WOOD-PIGEON'S CRY.—The Berkshire version of the legend is somewhat similar to that of the Irish, with the exception that the would-be thief is supposed to be a Welshman, and the bird is made to say "Take two cows, Taffy," instead of "Take two coos, Jemmy," or "Take two sheep, Taffy."—*W. H. Warner, Kingston.*

COLE TIT (p. 22).—With reference to the name "Burrow-down Tit" and the burrowing propensities of this bird, it may, perhaps, interest "F. D. S." to know that the nest of this tit is occasionally found in a hole of the ground, perhaps hollowed out by the bird itself.—*W. H. Warner, Kingston.*

HOW DO HADDOCKS SPAWN.—My cook has frequently told me that she has often found both hard and soft roe ("milt" and "roe") in the same fish This I did not believe until this morning (Jan. 15), when she said again that she had found both roe and milt. On doubting which, she said there were two unopened fish, would I come and see them opened? I went; one was a male with only "soft roe," or "milt," and the other had unmistakably two "milts" and two "roes," male and female, in full development. It is undoubtedly a "fact." Is it usual?—*H. O. Sterland.*

VALERIANA PYRENAICA AND OTHER PLANTS.—Touching the subject of rare plants, or of those, at least, which, to my mind, are generally too much regarded and spoken of as being doubtful natives of this country, I think I can, in addition to, and upon evidence of an almost equally conclusive character as that claimed by Edwin Lees, F.L.S., for *Astrantia major*, mention another, namely, *Valeriana pyrenaica* (Pyrenean or heart-leaved Valerian), which plant was found by me growing in great luxuriance and plenty up a woody dell in Derbyshire, where no doubt it has flourished for years; and its growth, too, being so apparently confined to the spot *in that part* seems, to me, to afford proof sufficiently strong to disestablish all doubt as to why it should not, along with many others, which appear to be recognized as native upon no clearer evidence, be comprehended also. But as it may be that my principal authorities—Mr. Pratt and G. Bentham—might not be in agreement with other writers on this point, or at all events, with the Rev. J. D. la Touche, in his "Archæology of Rare Plants"—provided it be there mentioned by him—in which case, or otherwise, I shall trust to the kindness of those who are in possession of that work giving me the information. Two other plants, which I also found growing not very far away from the *Valeriana pyrenaica*, and whose nativity to this country is alike disputed, were *Helleborus viridis* and *Epilobium angustifolium*, which latter, though, perhaps, comparatively rare as a wild plant, yet had much, in this instance, to favour the idea of its being an escape. A record of plants gained through some such medium as that suggested by Mr. Blair, or F. Arnold Lees, F.L.S., in SCIENCE-GOSSIP, must, in the long run, prove very valuable and interesting, besides, at the same time, facilitating the better determining of such plants that may or may not be indigenous.—*John Harrison, Newcastle-on-Tyne.*

TUSSILAGO FRAGRANS NOT PETASITES.—In last month's SCIENCE-GOSSIP, Mr. S. Smith mentions having found *Tussilago petasites* at the foot of Clifton Rocks, "in full flower, and *leaf also*, on the 1st day of January." From his description, I have no hesitation in saying that the plant is not *Tussilago petasites*, but *Nardosmia fragrans* (*Tussilago fragrans*), the Sweet-scented Coltsfoot or Winter Heliotrope. In Macnight's "Manual of British Botany," it is thus described:—"*N. fragrans* (Richenb.), Sweet-scented Coltsfoot. Leaves appearing with the flower, cordate at the base, orbicular, dentate; the teeth cartilaginous; glabrous above, pubescent on the nerves beneath. Scales of the involucre acute, about the length of the flowers. Submale flower, ligulæ oval-oblong, generally longer than the involucre. Subfemale flower, not known. Native of the south of Europe. Cultivated in gardens. Very common. Flower white or light purple. January, and February. Perennial." In Loudon's "Encyclopædia of Plants," *T. fragrans* is distinguished from *T. petasites* thus:—"*T. fragrans*, Thyrsus fastigiate. Leaves roundish cordate, equally toothed, downy beneath; flowers from January to March. *T. petasites*, Thyrsus ovate-oblong. Leaves cordate, unequally toothed, with the lobes approximate, downy beneath; flowers, March and April." *T. fragrans* is called Sweet-scented Coltsfoot, from the pleasant odour of its flowers. The plant found by Mr. Smith is probably an *escape* from a garden.—*Wm. Harkness.*

PLANTS AND GAS-LIGHT.—I have on the table before me a pot of yellow crocuses, which at nine o'clock at night were closed (in fact, they had not opened). At eleven o'clock they were all fully expanded, and at 12.30 p.m. were closed again. The temperature of the room is quite ordinary, and the gas has been full on all the night. The gas-light evidently caused them to expand, but why do they, after about an hour, close up again? Has the gas poisoned the atmosphere, as suggested (p. 191, August, 1872) by Mr. White, or has the hour anything to do with it?—*H. M. W. N.*

NOTICES TO CORRESPONDENTS.

We must remind our friends, who make use of this column, that the following rules should be strictly adhered to :— First. That perfect specimens be sent. Secondly, That all the information as to habitat, &c., that the inquirer can give should be forwarded with them. Thirdly. To bear in mind that drawings, unless very perfectly executed, are useless, and a tyro is very apt to omit some distinctive characteristic which would enable the examiner to decide the genus and species of the object sent. Lastly. Never to send an object for identification until the inquirer has used his best endeavours to find out for himself all the information he requires. Questions are very frequently sent, which the slightest effort on the part of querist in looking through some elementary treatise would have given all the knowledge required.

E. Mayers.—Your butterflies came to hand, but we don't know what to do with them. We have paid for the parcel. Please not to send us any more. We are always willing to oblige our correspondents in a reasonable manner, but we cannot undertake to sell objects for them.

A. E. M.—Many thanks for your suggestions. We are always glad to receive them from contributors. That about publishing Gossip weekly has already been made, but we do not see our way clear to it at present.

K. H.—Your supposed fern is an exotic Lycopod, or club-moss.

P. B.—Your fungus was a young specimen of *Polyporus squamosus.*

E. C. Jelly.—Your specimens were—1. *Asteroma veronica;* 2. *Septoria fraxini;* and 3. *Fusidium album.*

F. T.—Your specimens were the larvæ of the Drone-fly (*Eristalis tenax*). The long tail is the organ by which they breathe.

G. R.—The "Horse-hair Eel" (*Gordius aquaticus*) is *not* transformed from soaked horse-hairs. In its early stage it is an internal parasite of an insect, generally a beetle. It leaves it to deposit its eggs in water. See Science-Gossip for 1865, pages 107 and 197.

J. E. F.—You cannot do better than get Van der Hœven's large two-volumed work on Zoology. It is still one of the best authorities. The pronunciation, however, is *not* marked in it. We are in the constant habit of using Van der Hœven, and prefer it to any other for fulness in detail.

W. T. Iliff.—Thanks for the specimens of *Tussilago petasites* and *T. fragrans.* The latter still retained its perfume when it arrived.

Bryum.—Mosses: 1. *Weissia viridula;* 2. *Hypnum lutescens;* 3. *H. prælongum;* 4. *H. cupressiforme.—R. B.*

H. H. Cooke.—The eggs marked No. 1 are those of some species of Pigeon; they are easily distinguished from the eggs of the Owl by their polished surface, and the finer texture of the shell. No. 2 is the egg of the House Sparrow (*P. domesticus*); 3. a variety of the Song Thrush occasionally met with; 4. Lesser Redpole, and 5. (if the egg referred to in the note which accompanied the eggs) a malformed egg of the Redstart. Without the description of the nest, it would have been impossible to recognize this egg.—T. S.

Medicus.—We know of no preparer of microscopical objects who prepares specimens of morbid anatomy and pathology. There is little or no demand for them, and they do not as a rule, keep well. More can be learned, in the way of preparing them yourself, by taking in the *Monthly Microscopical Journal,* or by studying Beale's "How to work with the Microscope," than by obtaining such ready-made preparations.

Rev. J. H. Cooke.—Your fungus is *Peziza coccinea,* one of the commonest species of the genus.

S. Tagg.—We are sorry we could not answer your query sooner. The Duck is the "Shoveller" (*Anas clypeata*). The fossil shells (of which your sketch was too rough and vague to make anything distinctive out) are evidently Lower Carboniferous forms, probably from the Yoredale shales, and some species of *Nautilus.*

C. J. Wilson.—The "London Catalogue of British Plants" is published by Hardwicke, 192, Piccadilly, price sixpence.

EXCHANGES.

Swiss Lepidoptera for British.—Tertiary Fossils from the Isle of Wight, for Fossils from the Coralline crag.—C. 7, Buckingham Place, Clifton, Bristol.

For Atlantic Soundings, send object and stamped addressed envelope to Jno. H. Martin, 86, Week Street, Maidstone.

British and European Mosses for the rarer Mosses, Jungermanniæ, or Lichens.—T. H., Highfield, Sydenham Hills.

A number of well-blown Eggs, in exchange for well-set Lepidoptera. List on application to J. Walser, 14, Sudeley Street, Brighton.

Distillation from Vapour of Coke.—An interesting slide of this remarkable liquid will be given in exchange for any specially good object.—Send list to Alfred Allen, Felstead, Essex.

Eggs of the Little Auk, Heron, Phalarope, Stint, Grouse, Widgeon, Harlequin Duck, Scoter, and many others for rare eggs. Minerals and Fossils for Insects.—J. T. T. Reed, Ryhope, near Sunderland.

Wanted, Lias Fossils in exchange for Mountain Limestone species.—John Harker, Richmond, Yorkshire.

Well-mounted Sections of Teeth, &c., from coal, for well-mounted Geological Microscopic Slides.—H. B. Thomas, 13, Market Place, Boston, Lincolnshire.

Zonites excavatus, Zonites purus, Helix lamellata, for other British Land and Fresh-water Shells.—J. Whitwham, Cross Lane Marsh, Huddersfield.

Cypræa Europæa, Nerita viridalis, Planorbis contortus, P. nitidus, Helix pomatia, Cyclostoma elegans, for other British Land and Fresh-water Shells.—B. F. Buxton, J. Hewitt Esq., Rottingdean, Brighton.

Microscopic Objects in exchange for Sponges or other objects of interest.—T. W. Cowan, Horsham, Sussex.

Hypnum verrucosum and *Hypnum intermedium* for other good Mosses.—Send lists to J. Bagnall, Jun., 102, New John Street, West Birmingham.

Well-mounted Sections of Crocodiles' Teeth for other well-mounted slides. Diatoms preferred. Send list.—W. Nash, Stroud, Gloucestershire.

Acarus (Madras) on Plants and Osteological preparations, offered for Deep-sea Soundings and Diatoms.—J. H. Wollaston, Wells, Somerset.

For large Dendritic Spots on Blue-wove Paper, send stamped directed envelope and object of interest to S. W. Godfrey, 6, Amersham Grove, New Cross, Deptford.

Red-throated Diver, Scaup Duck, Richardson's Skua, Dipper, Red Grouse, Curlew, Hawfinch, Landrail, and Wood Lark, for other equally good eggs. Unaccepted offers not answered.—Fred. Anderson, Alresford, Hampshire.

Lepidoptera for other Lepidoptera, British or Foreign, or microscopic slides.—Joseph Anderson, Jun., Alresford, Hampshire.

BOOKS RECEIVED.

"The Lens," November, 1872.

"Nineteenth Annual Report of Brighton and Sussex Nat. Hist. Soc.

"The Ocean World," from the French of M. Figuier. New edition, revised by Dr. Percival Wright. London: Cassell & Co.

"The Astronomical Almanack for 1873," by Dr. Hollis. London: Simpkin & Marshall.

"Records of the Rocks," by the Rev. W. Symonds. London: John Murray.

"School Manual of Geology," edited by A. J. Jukes Browne. Edinburgh; Adam & Charles Black.

"Les Mondes."

"Land and Water."

"American Naturalist," January.

"Canadian Entomologist."

"The History of Polperro." By the late Jonathan Couch, with life of Author, by Thos. Q. Couch. London: Simpkin & Marshall.

"Report of Birmingham School of Nat. Hist. Soc."

"Gardener's Oracle and Floricultural Year-book, 1873."

"Moore's Gardening Guide, 1873."

"On a Hæmatozoon inhabiting Human Blood." By T. R. Lewis.

"Report of Microscopical Researches on Cholera." By T. R. Lewis, M. P.

"Ozone and Antozone." By Dr. C. B. Fox. London: J. & A. Churchill.

Communications Received from—R. M. B.—T. P. B.—G. R. R.—W. V. A.—J. H. M.—J. C.—B. F. B.—F. W.—G. R. J.—R. A. P.—T. Q. C.—H. A. A.—W. W. H.—F. C. F.—A. M.—G. W.—E. R. T.—H. P. M.—J. S W. D.—W. H. McL.—J. H.—J. W.—H. H. C.—G. S. S.—W. R.—H. B. T.—J. H.—T. T. R.—T. A. R.—F. G. E.—H. M. A.—W. H. W.—J. B.—W. T. L.—P. S.—K. H.—G. A. L.—J. F.—F. A.—J. E. F.—J. H.—A. E. S.—J. W.—J. R. J.—L. V. H.—T. H.—W. H.—W. S. P.—A. A.—T. B. W.—E. H.—E. J.—H. S. H.—D. G.—H. A. A.—G. S. S.—J. H.—M. L. G.—J. D. La T.—F. M. W.—H. M. W.—F. K.—T. S.—T. W. C.—H. M. A.—J. B.—E. A. N.—C. H. R.—F. C. R.—A. K.—F. A. & J. A.—J. H. W.—W. L. N.—J. B.—C. J. W.—S. W. G.

ALPINE PLANTS.

THE botanist who is well acquainted with the Flora of his own country may often be puzzled by the diversity of forms and multiplicity of species in the Alpine Flora. The following speculations which we venture to give, based on known facts, may, therefore, not be uninteresting.

Alpine plants may be divided into three classes: 1st. Those found exclusively in mountainous regions. 2nd. Those found also in high northern latitudes. 3rd. Those closely allied to species which grow in the plains. Let us see what is the origin of these three classes.

That the geological period preceding the glacial epoch was one of considerable heat is shown by the fossil plants found in the Miocene formations of Greenland. The advance of the glaciers gradually destroyed most of the vegetation of this period; some of the original denizens of the mountains remained, however, on high ground, not covered by snow and ice; but the altered conditions of life were not favourable to their development, and they are now few in number, frequently monotypic, and found in a limited range. Such are the genera

Arctia	Erinus	Hugueninia
Soldanella	Astrantia	Wulfenia
Berardia	Pæderota	Dracocephalum
Tozzia	Cherleria	Horminum
Ramondia	Willemetia	Petrocallis

These are the plants of our first class.

The glaciers brought with them plants and seeds from the Arctic regions, and these established themselves on the higher summits. The varieties of climate and geological formation in the great mountain-chain which extends from Spain to Siberia are considerable. These influences would modify these northern plants, and in course of time would even cause the formation of new species, so that they now outnumber, both in species and individuals, their Arctic congeners, whose development has been restricted by a narrower area and uniformity of climate. A curious fact bearing on the origin of these plants is that comparatively dry mountain-ranges, such as the eastern Alps, which have a climate somewhat similar to that of the cold, dry Arctic regions, are richer in species than more humid ranges, such as the Bernese Oberland and Scotland. Some of the principal genera of this, our second class, are

Draba	Sagina	Potentilla
Arabis	Stellaria	Sibbaldia
Cardamine	Saxifraga	Oxytropis
Cerastium	Ranunculus	Dryas
Lychnis	Pedicularis	Sedum
Arenaria	Juncus	Salix

That the temperature of the Alps has varied considerably since the glacial period is shown by the alternate advance and retreat of the glaciers. Legends exist of once fertile valleys in spots which are now covered with snow and ice, and it is said that the great ice barrier between Grindelwald and the Valais was formerly a much-frequented pass. During such favourable periods plants from the plains may have been gradually dispersed upwards, and mingled with the Flora of the former glacial period. There is very little doubt that large seas existed at the foot of the Alps, and this will account for the coast plants that are also found as Alpines, such as *Plantago alpina*, *Armeria alpina*, and *Rhodiola rosea*.

All these plants, which form our third class, have been much modified by mixing with the more ancient forms; they have also become dwarfed in

stature, but they still bear a strong family likeness to their congeners of the plains. Examples are

Linaria alpina	Phyteuma hemisphæricum
Globularia nudicaulis and cordifolia	Colchicum alpinum
Teucrium pyrenaicum	Gagea Liottardi
Ononis cenisia	Astragalus monspessulanus
Cerinthe alpina	
Helianthemum canum	

The great genera Primula and Gentiana should be included in this class. They have very few representatives in the Arctic regions, and attain their maximum development in the great Alpine chain, but at the same time they are well represented in the plains, whence probably they originally came.

With regard to the origin of our second class (the largest and most important), we ought to state that a different theory to that which we have given is also held, especially by some German botanists. They consider that the great centre of dispersion was from the Altai mountains, in Siberia, and not, as we suppose, from the Arctic regions of Europe. The principal argument in favour of their view is that many Alpine plants are represented in Siberia which are wanting in Arctic Europe; but this may be accounted for when we remember that the great variety of climate and soil in the Alpine chain would cause the development of fresh species, while the parent stock in Arctic Europe would remain comparatively stationary. And although it is true that some species which are found in Arctic Europe, as *Cornus suecica*, *Rubus arcticus* and *chamæmorus*, *Diapensia lapponica*, and *Nardosmia frigida*, are met with again in Siberia only, it is to our mind easier to suppose that these plants were dispersed from Arctic Europe, in the direction of Central Asia, by glacial action, than that they formerly existed in the Alps of Europe, from thence colonized the North, and afterwards became extinct in the Alps. T. Howse, F.L.S.

FLOSCULARIA TRILOBATA.

By F. Collins, M.D.

Mr. CUBITT'S remarks in the July number of the *Monthly Microscopic Journal* on my paper, published in the January (1872) number of your periodical, call for a few words from me.

In the first place, it was only on reading Mr. Cubitt's paper a few days ago that I first became aware of the fact that Mr. Tatem had previously described the large pelleted Melicerta* *M. pilula*, or, as I named it, *M. socialis*, in a communication read before the Quekett Microscopic Club in 1868. As I feel, therefore, that some apology is due to Mr. Tatem, I hope that he will consider a residence abroad, from early in 1867 to the end of 1869, a sufficient excuse, from me, for having overlooked his paper.

In the second place, with regard to *Floscularia trilobata*, I cannot allow, as Mr. Cubitt asserts, that this is a "pseudo-new species," and identical with *F. campanulata*, for they differ in many respects, the most prominent distinguishing feature being the arrangement of the disk, which in the latter is never divided into less than five lobes; at least such is my experience, and that also of every author whose descriptions of this rotifer I have read, while in the former the number of lobes never exceeds three. The lobes, moreover, in *F. trilobata* are larger, better defined, and have wider and more marked depressions or spaces between them; the creature itself is much larger, and differs also in its general configuration; its tube, too, is probably more frequently absent than present; and I have never seen it occupying so large, solid, and well-formed a tube as Mr. Cubitt in his drawing represents *F. campanulata* to inhabit.

I first discovered *F. trilobata* in 1865 (my acquaintance with the large pelleted Melicerta bears the same date), and, being unable to identify it with *any* of the described species, I wrote to Mr. Gosse on the subject, and after some correspondence was enabled to furnish him with a specimen. He, after careful observation, concludes a letter to me, dated October, 1865 (having first remarked on the number of lobes, &c., and compared it with *F. campanulata*), "And so yours is, no doubt a new species, as you conclude. My specimen, that you sent me, has laid an egg in the live-box, and so is certainly adult."

I believe this species to be very rare. I do not suppose I have seen many more than twenty specimens, but have had the opportunity of observing it from its infantile stage to old age and death. All my specimens were taken from one small pool in the parish of Sandhurst, Berks, which abounds in rare and interesting Rotifera. I have searched for *F. trilobata*, with a friend, in all the neighbouring pools and streams repeatedly, but invariably without success. Whether this pool is still in existence or not I cannot say, for it is now some six years since I quitted that neighbourhood.

It seems necessary that I should conclude by stating that my former paper was written simply for the purpose of placing on record the existence of certain species of Rotatoria that I believed to be undescribed.

* Mr. Gosse, to whom I sent specimens in 1865 and 1866, recommended me to name this species *M. coprodoma*, from κοπρος, dung, and δεμω, to build, from the fact that this creature builds its tube with its own excrement. This would, probably, be a better name than either *pilula* or *socialis*.

"It is only ignorance that sneers at a pursuit because the latter deals with common-place objects."—*Taylor's "Half-hours at the Seaside."*

OUR WINNIE.

VARIOUS have been the creatures from the animal kingdom—to wit the two "Pharaohs" of 1872—the record of whose lives have appeared from time to time in the pages of SCIENCE-GOSSIP. My jottings will not appertain to the bird of the night, whose similitude occupies so conspicuous a place upon the front of our interesting monthly, but to one of the quadrupeds represented to the right of the mystic bird—the scared burrower but partially represented, the common type of our rodents. To begin, our pet was presented to me when three months old, and was deemed by connoisseurs a beauty, though its breed, a mixed one, I cannot determine. Suffice it to say "bunny" was of the feminine gender, had dark fawn ears, feet, and tail, with a long, thin dark streak on the nose, the rest of the body being pure white, with eyes matching those of the common tame rabbit, a bright pink. The title of this subject has already shown the name bestowed upon the strange accessory to our household; and very soon Winnie was at home running an appointed period about the kitchen or grass plot during the day, and reposing in a box provided indoors by night. In a short time it was found impossible to keep up the creature, excepting when all was still and dark; by tooth and nail egress from confinement was generally obtained, and satisfaction gained by joining our company whether up or down stairs, in short, our experience was the same as that expressed by Cowper, who said of his hare, "happier in human society than when shut up with her natural companions."

Numberless were the tricks, and surprising the sagacity shown by Winnie. If out of doors, it was most amusing to watch her frisk on the grass, run round the walks, and all at once slily nip the lower end of a peony stalk, ending in the downfall of the glaring flower; but this, observed either by my husband, who often encouraged a repetition of "bunny's" propensity, or myself, was sure to end the furlough, and render immediate capture by hand necessary. Then came the tug of war, Winnie popping through the garden hedge into the field, and so sure as I passed by the wicket, "bunny" was back again, and *vice versâ*, until I had the help of a domestic. Indoors she would leap into my husband's lap, licking his hands or face, and would repose there for some time, well content if the ears or forehead were gently rubbed with the finger; she also became attached to a young relative staying with us. Dogs she did not appear to be afraid of, and as a favourite resort was the hearth-rug in my husband's office, once or twice she encountered those enemies there. In one instance a friend with a spaniel stayed some time, and upon leaving, "bunny," who had never stirred from her couchant position on the hearth, sprung at the dog as he was quietly leaving the room; at another time a greyhound stalked close past, but no apparent notice was taken by either. She was regarded by us much the same as the dog is in ordinary domestic life, and eventually had the run of the house, going up or down stairs as inclination led, meeting us after absence, and drumming the floor for recognition if not immediately noticed, calling forth the wonder of many strangers, who never supposed such sagacity and frolic existed in an animal so timorous by nature. As to diet, the usual herbs were given when obtainable, the casual handful of young clover culled during the evening walk, or the succulent dandelion or lettuce gathered, with an occasional turnip or carrot, formed the staple food, and for a standing dish a box of bran at night, with milk each morning, into which a little sugar had been dissolved, with the addition of a little warm tea in winter from the breakfast-table. Sweet bread, especially if it contained currants, or had a little preserved fruit upon it, was esteemed, the creature sitting up for it to be presented; and the endeavours made to obtain fruit when placed a little out of reach, or in folds of paper, were most amusing. Upon one occasion some young friends were rather chagrined by observing "bunny" stand up and deliberately reach from a plate opposite a very hot fire a portion of the muffin destined for their share; at another time the servant having placed a rolled pudding upon the kitchen fender, preparatory to placing it in the oven, upon return after five minutes' absence found a large hole in the outer dough and some jam extracted. After this "bunny" attended when pastry was made, and generally had a small portion allotted for her use. As Winnie grew older, like other mammals, she became more grave, and indulged less in those frisky leaps so peculiar to rabbits, would sit for hours alone, and was rather indignant if disturbed by an unknown hand, striking out with the fore feet at the intruder. The usual fate of most pets, alas, attended her: injury caused, we had every reason to surmise, by a careless domestic, ended Winnie's days. My husband and I, after doing all we could far into the night to assist the poor creature, witnessed her death, feeling we had lost as agreeable and social a pet as any of the usual quadrupeds introduced into our dwellings, having shared it with us for nearly seven years.

A few lines more and my history ends, a word by way of caution to those who might follow us in zoology. It takes time to teach the creature cleanly habits. To some extent this may be done, the dark corner sprinkled with sand may almost invariably be used, and little nuisance caused by management. The great difficulty is to keep rodents from trying their sharp incisors upon things in the way: if a bit of paper chances to be frayed from the wall, and within reach, it is sure to be enlarged; a hole in the

carpet will be daily nibbled unless closed up, hearth-rugs will suffer if any worsted ends are loose, and should the gudeman's fishing-foots be found, into how many pieces the thongs are nipped in very perversity I cannot say. "Bunny" sits as she did in life upon a piece of carpet under a glass shade, preserved by the hands of Mr. J. Shaw, of Shrewsbury, a memento of what can be accomplished by kindness and attention to the habits of dumb creation. EMMA JOHNSON.

ANCIENT PLANT-LIFE.

By JAMES NIELD.

THE following interesting paper on "Fossil Botany" was recently read before the Oldham Microscopical Society:—

Fossil botany, or palæophytology, is the name of that department of geologic study that deals with those vegetable organisms the remains of which are found in a fossil state embedded in some part of the earth's crust. This is the broad meaning. The term, perhaps, is more properly applied, and ought to be restricted, to those remains of plant-life the peculiar forms of which are now quite extinct. I thus narrow down the subject of our consideration to avoid redundancy. Let us take a cursory survey of the nature and sequence of plant-life on the globe, taking them in ascending order, and glancing hurriedly and briefly at the positions held by them in the systematic arrangement of recent botanists.

The Silurian period may properly be called the day of thallogenic life, a division which comprises the simplest forms of vegetable organisms, of which we may take marine algæ as representatives. These members of the vegetable kingdom are made up exclusively of cellular tissue, and increase in size by the simplest method of cell-growth and reproduction. Just as these cellulares are at the present day heaped upon our shores, so analogous forms covered the littoral boundaries of the old Silurian seas. I infer this from the many accumulations of impure coal, or anthracite, to be met with in this and other countries, and belonging to the Silurian formation. The individual plants composing these beds are, however, but very indifferently preserved, owing, partly, to their great age, the changes they must have endured in subsequent periods, and, perhaps, still more to the fact that their loose, cellular bodies possessed no strong framework of veins and veinlets to support them; their outlines are ill-defined, and therefore many of their most important characters and specific differences are little known. The Devonian, or old red sandstone age, seems to have been the first stepping-stone to the gorgeous flora of the Carboniferous period which succeeds it. Immediately we leave the upper beds of the Silurian, and step upon the lower beds of the "Old Red," we are met with plants claiming higher rank, more complex in structure, and more specialized in parts, than any encountered in the previous age. To the thallogens are here added forms which are believed to be acrogens, and named after living plants because of a supposed external resemblance to them — equisetums,

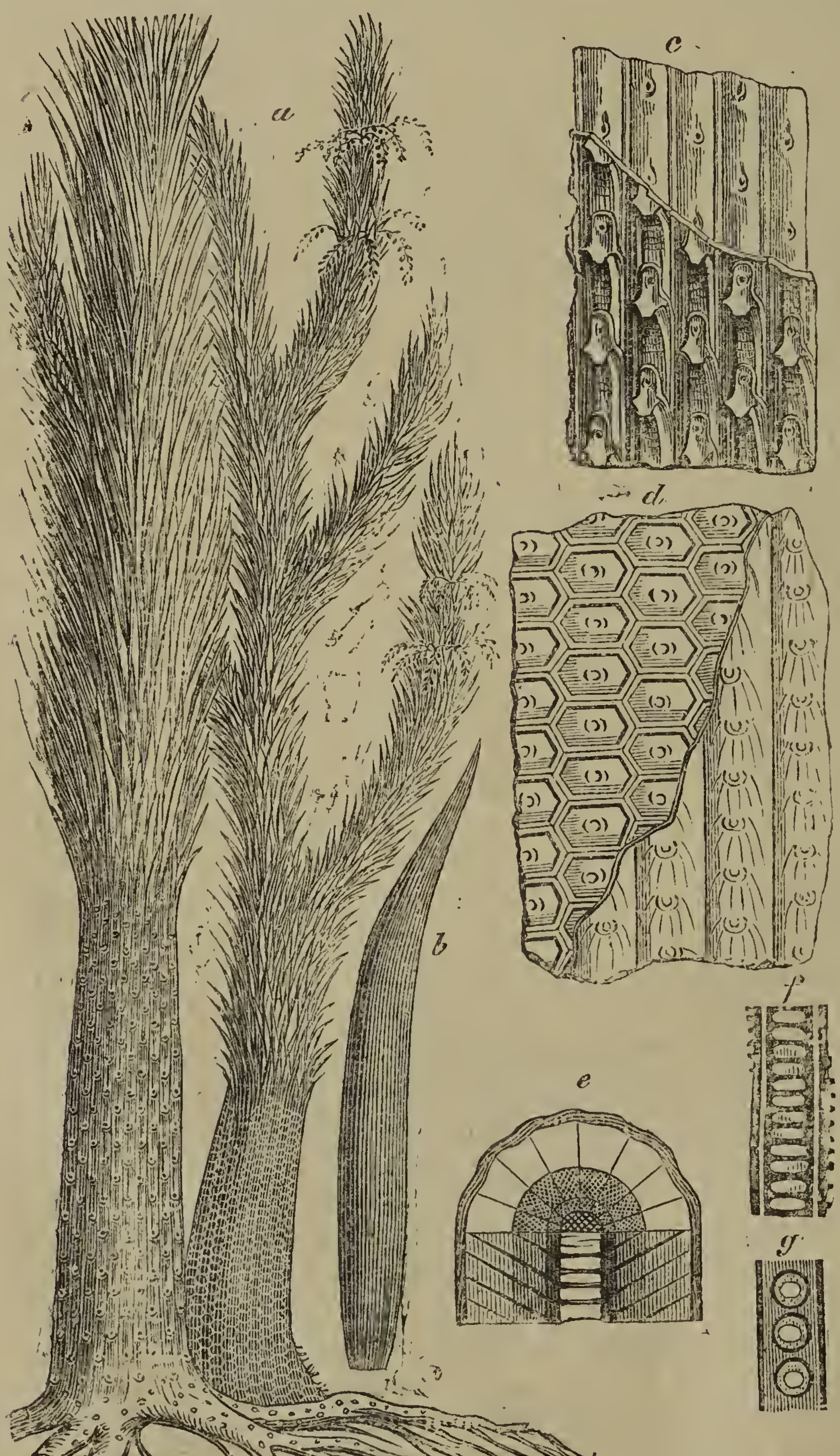

Fig. 47. *Sigillariæ* (restored); *b*, leaf; *c*, *d*, portion of trunk with bark of two species; *e*, transverse section of stem; *f*, scalariform vessels from ring surrounding pith; *g*, dotted vessels from outer part of woody rings.

reeds, rushes, lycopodiums, ferns, and a few forms which, if not true conifers, may be received as their herald. They are, however, met with but sparingly in this formation. These facts warrant us in taking this period as the dawn of acrogenic life. The flora as the whole, however, is but meagre, the remains, as a rule, ill preserved, and therefore the nature and affinities of the plants little known. During the succeeding Carboniferous epoch, vegetable life assumed an unprecedented importance. Here the acrogenic forms reached the period of their maximum development. Plants typified in the preceding rocks are more completely evolved, and accompanied by many new individuals. All this progressive change was not the work of a short time only, but had occupied the lapse of cycles of ages to elaborate it. Owing to some circumstances, into which we must not stop to inquire, the growth was most advanced, luxuriant, and abundant, the types conspicuous and well marked, and the conditions of growth, decay, deposit, and preservation increasingly intelligible. Unless our opinions, in future, be modified by additional facts gathered in new fields of inquiry, the phytologist may say, without fear of contradiction, that the world had never before witnessed so grand and abundant a flora. This was truly a day of plants. Araucarian pines, palms, tree ferns, cycads, zamias, gigantic reeds, and, doubtless, an undergrowth of horse-tails, herbaceous ferns, clubmosses, lichens, fungi, fruits, and a few indistinct forms, imagined to be flowers. To the geological pedant these objects are better known under the less popular names, lepidodendrons, sigillarias, ulodendrons, bothrodendrons, sternbergia, knorria, favularia, stigmaria, halonia, pinites, calamites, hippurites, asterophyllites, antholites, carpolites, trigonocarpons, sphenopteris, pecopteris, neuropteris, cyclopteris, odontopteris, otopteris, &c. And as this was, *par excellence*, a day of cryptogamic life, doubtless the conditions were highly favourable to a luxuriant growth of the fungi and lichens; but of their actual existence we have no proof. By referring to the list of plants given above, it will be seen that many of their names are of a provisional character only, they doing duty in the absence of names more accurately descriptive of the nature and affinities of these old world organisms; as lepidodendron (scale-tree), sigillaria (seal-like), calamites (reed-like), &c.

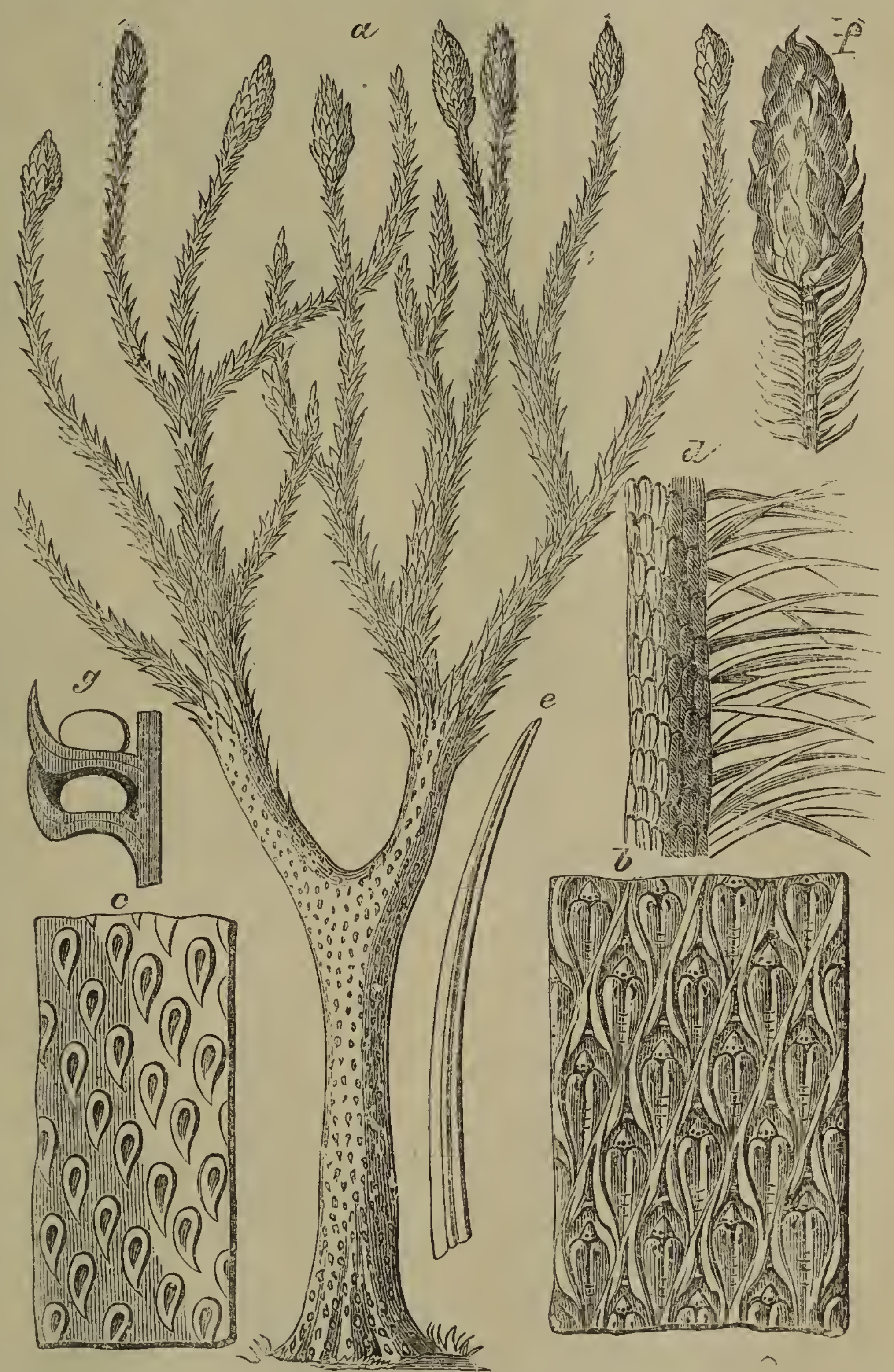

Fig. 48. *Lepidodendron* (restored); *b*, *c*, portion of bark of ditto; *d*, branch with leaves; *e*, leaf; *f*, catkins; *g*, bracts of ditto, inclosing spores.

It is but common prudence to let this remain so until much more information has been gathered, specimens microscopically examined, and scientifically handled and applied by competent men. This process alone can furnish reliable data. My own individual knowledge of, and pleasurable labours among these fossil plants, warrant me in saying that several of them ought to stand at the head of genera covering many species; while others, hitherto received as distinct species, are undoubtedly only one and the same form in a different state of preservation, &c. Before quitting this part of our subject, it may not be unprofitable to remember that the estimated number of fossil plants of the Carboniferous period known to geologists is about 600, of which a full third are believed to have been ferns. These figures contrast strangely with the relative number of the phænogamic and cryptogamic plants of Great Britain at the present day—a flora consisting of 1,600 species of flowering plants,

and about 50 species of ferns only. Let us now push on in our journey upwards in time and place, noticing briefly one or two formations whose flora, in the known parts of the world, is but scanty, or which we may conveniently group under some other head, and selecting those only whose flora is conspicuous and well marked. Judging from the few and imperfectly preserved representatives known to the geologist, the flora of the Permian and Triassic periods was a meagre one, and need not detain us. Our knowledge, however, of the subsequent Oolitic period enables us to speak with more assurance of the nature and affinities of the vegetable forms then present, and the amount of progress made in specialization of parts. The bituminous shale, or coal of Kimmeridge, the lignite and coal of the Scarborough coast, of Brora in Sutherlandshire, of Virginia in America, the coal of Hindostan and the Indian archipelago, belong, without doubt, to this period, and owe their origin to remains of plants which, to our eyes, are tropical or subtropical in appearance, and are known by names that to many of us are very unfamiliar. In order that we may form a rough estimate of the grandeur, abundance, and variety of the plant-forms of this age, I will enumerate a few of them, requesting you to note, *en passant*, the fact that, with all their strangeness of form, the flora of this period has an increased familiar look about it. Amongst coniferæ, our old acquaintance araucarites has, as companions, cupressinites, pinites, taxites, abietites, and thujites. These are the then highest exogens. Amongst endogens, cycads are still present as cycadites, zamites, palæozamia, zamiostrobus, and tree ferns. We have others lower in station, and very chara-like in appearance; chara, naiadites, and sphærococcites and lily-like plants, and our former friends equisetites, lycopodites, and halymenites. It is, however, in the tertiaries that we see we are drawing home to the present flora—by the familiar faces with which we become surrounded in these rocks. Though the tertiary landscape has about it an increased look of familiarity, yet the flora is much less English and European generally than subtropical. The analogues of the then living plants must now be sought for on the European shores of the Mediterranean, the warm, temperate parts of Asia, Africa, Australia, and America—camphor-trees, sarsaparillas, fan palms, flabellarias, palms, tulip-trees, Banksias, magnolias, vines, fig-trees, laurels, and evergreen oaks; and in the upper beds a species of plane-tree, maple, walnut, juniper, willow, cypress, yew, pine, bean, pea, chara, mosses, lycopodiums, ferns, horse-tails, mare's-tails, fruits, and flowers; and I may add lichens and fungi. In a flora numbering thousands of species, there were about eight hundred flowering plants, three hundred and upwards of which were evergreens. This would now seem a strange flora for Europe. The lignite beds of Bovey Tracey, in Devonshire, have yielded about fifty species. The English fossils, however, are common to the beds of the continent, where they are much more abundant, and specifically more numerous. At this point I wish to remark

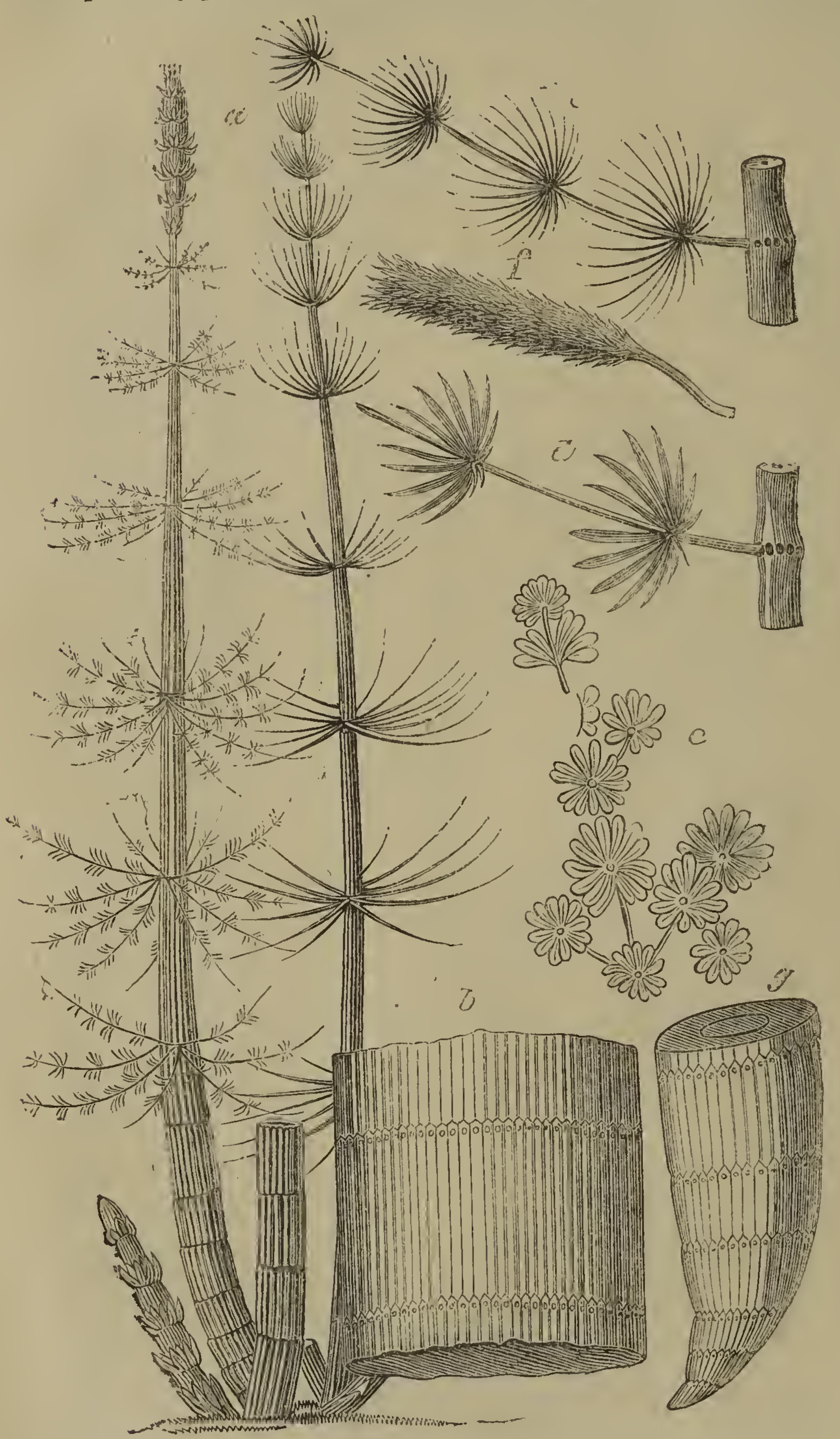

Fig. 49. *Calamites* (restored); *b*, portion of stem; *c*, *d*, *e*, branches with leaves; *f*, catkin; *g*, radical end of stem.

that many of the above-mentioned plants were not identical with those living at the present time, but with these we step upon the landing which opens up the English landscape. I would further remark that it is not till the period under review that true dicotyledonous trees, exogenous in their mode of increase, bearing reticulated leaves, and otherwise highly differentiated, are introduced. Indeed, previous to this period several whole orders, which now minister abundantly to the wants of man, were entirely wanted. As an example, the order Rosaceæ, which gives us our apples, pears, peaches, apricots, quinces, plums, strawberries, raspberries, blackberries, &c., was unknown. A further remark, perhaps, may not be out of place here. In order to understand and duly appreciate the history of fossil plant-life, we should not forget that, during our progress upwards we have passed through many gradations of progressive development, beginning in the lowest rocks, with a flora humble in structure and scanty in species, and ending with what we may call the present plant-forms, the highest, most varied, and most specialized. A knowledge of this fact is deemed a potent weapon in the hands of those biological speculators who believe in the evolution theory.

Fig. 50. Microscopical section of Fossil Wood from concretionary nodules, Lower Coal-measures, Oldham.

The fossil remains of plants now exhibited have been disinterred from beds of rock differing widely among themselves in the nature of the material of which they are composed, and have been deposited under very dissimilar circumstances. They all, however, agree in belonging to the Carboniferous epoch. Those of sandstone are but casts of plants from the common building-stone of the neighbourhood, a rock which is intercalated with the seams of coal and shale. These, along with those of the shale, give no assistance to the investigator except such as can be gleaned from their external forms and markings. A few have been met with in concretionary ironstone nodules, locally known as "bullions," which are found numerously imbedded in the shale, and one or two have been derived from the floor-clay beneath the coal seam. This floor-clay is the invariable accompaniment of coal, and is probably the remains of the original soil in which these ancient plants grew. These specimens, and those from the nodules in the shale, are seldom met with containing reliable internal structure The best light by which coal-measure fossil plant-life is now read, is given off by the coal itself. Coal is now made to yield up its own secrets, after a silence of untold ages. The specimens of fossil wood, by which the life history of the coal period is now deciphered, are, as far as my own experience of this locality extends, found imbedded in the coal. A small seam, varying from a foot to eighteen inches in thickness, and cropping out on the hill-sides about Crow Knoll, Besom Hill, &c., and known as the "upper foot seam," supplying the entire yield in this neighbourhood. This seam of coal is one of the "gannister series," otherwise called the lower coal-measures. The nodules containing the calcified plant-remains are in shape more or less spherical, or long flattened ovals. These fossil-bearing nodules occur in such numbers in some parts of the above-mentioned seam as to seriously interfere with the work of coal-getting often causing the whole working to be abandoned. It may perhaps not be unworthy of note that these calcareous masses, though seldom known to contain fossil shells themselves, are invariably accompanied with a great abundance of shells in the shale above the coal. Can it be that the triturated matter o these shells, mingled with the estuarine mud (now shale), has [furnished in part the material of the nodular matrix of this fossil wood, the matter so provided aggregating itself round some object as a nucleus? This limy matter, by surrounding the wood with an envelope, has protected it from the destroying action of bituminization which had seized the surrounding vegetable matter. The *modus operandi* by which plant-remains have been preserved in these nodules is not yet well understood; therefore I shall notice it but briefly. It is within the bounds of probability that mineral and earthy matters, while in a state of solution, enter the pores of the vegetable tissue, and replace it, particle by particle, as the original organism passes away. All the information that we can gather on extinct plant-life points to the fact that species in geologic ages were less numerous than at the present time. Individuals were, doubtless, as numerous in many periods as now, but generic and specific differences, there is reason to believe, were not proportionably abundant. This is explained by assuming that the time that had elapsed since the first introduction of vegetable organisms, say to the Carboniferous age, though immeasurably great, was but the early dawn of a long biogenical day, during which the laws of variability and specialization had not had sufficient time to exert their full influence. There appear to have been fewer botanic centres then than now. Types were more cosmopolitan—more widely diffused over the earth's surface. It must not be

imagined that the few forms now known to the geological botanist even approximately represent all that existed at any given period. It is quite premature to assert that there were no well-marked plants then with which we are not now acquainted. It is much more in accordance with recent discovery to say that there were many such well-defined genera and species that have not yet come to light, and probably a much greater number of less decided character, and highly perishable, which have passed away, leaving no trace of their former existence, except as bituminized matter. Glancing at our own day, we are right, I think, in presuming that out of the hundreds of thousands of individual plants that die annually an exceedingly small per-centage will be known to the future geologist. They rise, grow, flower, fruit, and decay, without leaving a single cell or vessel for the future microscopical investigator to rest his eyes upon. Though admitting the extinction of whole types of plants which a geologic survey forces upon me, I am not prepared to acknowledge that there has ever been at any period of the geologic past a total or violent extinction of plant-life, or of necessity, a new creation of fresh forms equally sudden in its operation and effect. The data upon which opinions on this subject are founded are yet incomplete, but sufficient evidence is at hand to justify us in stating that the transition from one well-marked form to another equally distinct has been accomplished by the most gradual process, that change has succeeded change, from low have higher been evolved, and whole types have died out as gradually as night melts into day by the interposition of twilight. The difference between the simplest thallogenic growth of the Silurian period and the most complex exogens of modern times is but the result of the action of laws ever exerting their strength to enforce progressive change, and of effort on the part of the individual organism to adapt itself to the unstable and ever-altering conditions by which it has never ceased to be surrounded, in a world that knows no rest.

A VISIT TO DUNGENESS.

As Dungeness is a place difficult of access, and therefore visited by few persons, a short account of a walk round it may be interesting to the readers of Science-Gossip.

Starting from Hastings one day in August last, a friend and I took tickets for Appledore, a small town distant about sixteen miles. Thence we walked through the villages of Snargate, Brenzett, and Old and New Romney, the latter being seven miles from Appledore station, and about one mile from the sea. On our way we passed large heaps of stone, placed at the sides of the road, to be in due time used for macadamizing, which were literally full of fossils of various kinds, many being a species of oyster, four or five inches across. In one we found the remains of a large ammonite, in others pieces of fossil wood, &c. I could not help remarking what a rich harvest for a geologist the quarries at Hythe, from whence we were told the stone came, would prove. We arrived at New Romney about half-past five, and after a short rest started for the lighthouse.

Here let me give a general description of Dungeness. It is a low headland on the boundaries of Kent and Sussex, and runs about six miles into the sea. It is composed entirely of beach, which, according to fishermen living at the point, accumulates on the east side year by year; thus causing the extreme point to shift slowly in that direction. The nearest *terra firma*, if I may so say, is four miles from the point, and is the small town of Lydd; while to the east, at six miles' distance, is New Romney, and on the west, eleven miles off, is Rye, all the intervening ground being entirely beach, except in places where vegetation is struggling for existence. We chose New Romney as our starting-point, because at a certain time of the tide there is sand the whole way from thence to the lighthouse, whereas from Lydd there is nothing but beach.

Leaving New Romney, we made direct for the shore. Here a most remarkable view presented itself. In front of us stretched for many yards the sand—sands such as I have never seen before, sands that many watering-places would give almost any sum to possess—not a rock in sight, and along them was proceeding a horse and cart as easily as on a level road. To our left lay what appeared a small mountain-ridge, stretching far out into the sea. This was a part of the coast of Kent, with Folkstone and Dover in the distance, and terminating in the South Foreland, the high cliffs of Dover looking remarkably grand and majestic. On our right lay a long expanse of beach and sand, and in the far distance appeared the lighthouse, the chief object of our visit. Between us and it nothing intervened but a few solitary houses built on the beach, among which a coastguard station was conspicuous by its flagstaff, and wrecks of many noble ships dotted the coast; while behind us lay the beach in all its barrenness, relieved only here and there by patches of green, New Romney and Lydd appearing in the background.

We took at once to these sands, thus avoiding the "never-to-be-forgotten" beach (any one who has laboured along it as we did next day will agree with me that it is difficult to find an epithet strong enough to describe its wearisomeness). During our walk we passed numerous shells of varied hue, which made me wish I were a conchologist, and also thousands upon thousands of the cases of a marine worm, composed of fine sand, and varying in length from one to three inches, their shape being an elongated cone with the apex cut off. They were quite

new to me, and differed entirely from those commonly found on the Hastings coast. Above us hovered large numbers of seagulls and other birds; while sand-larks skimmed along the surface. Continuing our walk for about five miles, we reached the most primitive "hotel" I have ever had the privilege of visiting, the "Britannia," kept by W. Lawrence, a fisherman. But although most primitive, it was clean and tidy—two very essential points as far as comfort is concerned; and I can conscientiously recommend it to all who do not object to early English manners. It is a low, black house, with a few sheds of similar colour round it, and, as all houses in that locality must necessarily be, is built on the beach, a small piece of which, about thirty feet by fifteen, is railed off and sprinkled with earth to constitute a garden. The inhabitants are in happy, or rather unhappy, ignorance of the postman's rap or the milkmaid's cry, milk being a luxury there unknown. The butcher pays them a visit once a week. To enable the natives to walk over the beach, they attach pieces of board to their boots in the manner of snow-shoes.

A minute account of the lighthouse being unsuitable for this journal, I will pass it with but a brief description. The building is of brick over 100 ft. high, and is illuminated by the electric light, generated by two large electro-magnetic machines,

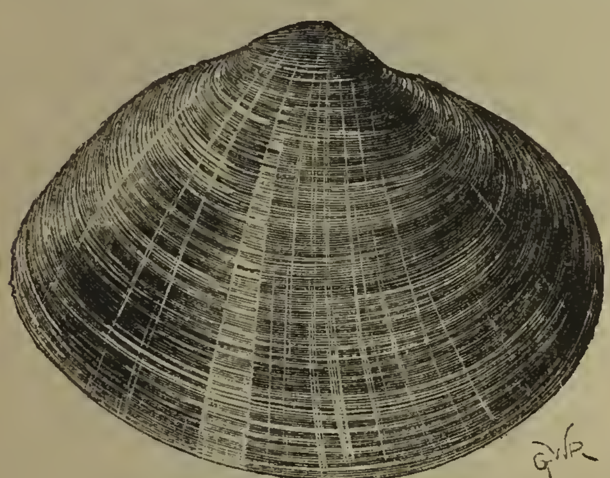

Fig. 51. *Mactra stultorum.*

driven by means of a steam-engine; the light is stationary, and appears white out at sea, while on and near shore it is red, thus warning the sailor when he is too close to land; notwithstanding which precaution, numerous vessels run aground. Even the night we were there, a large steamer was stranded nearly opposite our "hotel;" but being smooth water, it got off next tide; but remains of ill-fated ships are visible on all sides, the wreck of the *Morning Star* being particularly conspicuous, and that of the *Spindrift* affording topic for much conversation. In front of the lighthouse there is a large horn, blown by machinery in foggy weather, and around the base of the lighthouse cluster the habitations of the light-keepers and their families.

The next day we continued our circuit round the west side of the Ness, to the old Cinque-port of Rye, eleven miles distant. Being assured by our host that in the afternoon we should have sand, we waited till two before we started, and then struck across the headland for about a mile, thus cutting off the extreme point. The vegetation on the part we crossed was comparatively luxuriant, and we noticed several varieties of plants growing between the stones and stunted grass. There is little doubt that a great part of the land, now beach, will soon be covered with luxuriant vegetation; but even at the present time I am quite sure that a visit to Dungeness would amply repay a botanist, conchologist, entomologist, or almost any other ologist, who should think it worth while to undergo a little fatigue.

When we reached the sea-shore, we were wofully disappointed: the tide was full—no sign of sand; but we made the best of the matter, and set of for our walk of eleven miles. Strewn over the beach was a rich harvest, especially for the microscopist: would that I could have devoted time to it, but unfortunately, having expected sand instead of beach, we had now to hasten forward to catch the train. On our way we passed many varieties of sea-weed, for the most part, however, dried up by the sun, the water that day not having reached its usual height; but a ridge traceable along the whole beach told of a glorious tide for treasure-seekers having taken place a few days previously. Numbers of sea-urchins, with spines complete, sea-mice, several varieties of sponges, dead-men's-thumbs (*Alcyonium digitatum*), and especially vast numbers of *Mactra stultorum*, many razor-shells and several spatangi.

Having traversed about nine miles of beach, the sand, to our great relief, began to appear, so in due time we reached Rye, and returned to civilized life. A. E. M.

THE PATHOLOGY OF PEARLS.

IN a recent number of the Journal of the Linnæan Society are some interesting remarks by Mr. Garner, F.L.S., "On the Formation of British Pearls and their possible Improvement." Every one is aware that an oyster or a mussel, as the case may be, when irritated by a foreign body, is reduced to the necessity of toning down the annoyance of the intruder by shedding around it, through the agency of its "mantle," layer after layer of lovely "nacre," or mother-of-pearl. Such is the origin of those pearly concretions which may be found adherent to the inside of the shells of the above-named molluscs. The rounder and more valued pearls are said to be formed in the soft parts only of the animal, of which a good example may be seen in the educational series in the Museum of the Royal College of Surgeons, in the shape of a round pearl imbedded in the foot of a *unio*, or a fresh-water pearl-mussel. Mr. Garner has found reason

to abandon the generally received idea of the grain of sand which plays the part of the crumpled rose-leaf to the molluscous sybarite, and concludes, from observations made on the marine mussel (*mytilus*), his conclusions being supported by the independent researches of Signor Antonio Villa, in Italy, that the exciting cause is no inorganic particle, but is actually a minute parasitical entozoon (a species of *distoma*) in the *mytilus;* while in the *anodon*, or fresh-water mussel, it is a minute mite, or acarus (*Atax*)—in fact, an itch insect. The presence of such parasites as a nucleus he has proved by treating the pearls with a dilute acid. Mr. Garner then hints at the possibility of setting on foot a kind of pearl nursery, so to speak, where the cultivation of this precious ornament may be carried on; citing the Chinese as an example, who, as is well known, not only introduce metallic figures of Buddha between the shell and mantle (there to be pearl-washed by the mollusc for the ultimate benefit of the faithful), but even go so far as to bring about what may be termed a "margaritiferous" diathesis, by contaminating the water inhabited by the mussel. With regard to such diathesis, it may be interesting to mention a theory of a celebrated French zoologist. M. Lacaze-Duthiers put forward some years ago, in the *Annales des Sciences Naturelles*, that a mollusc so affected is in the condition of a calculous or gouty subject, its blood being highly charged with the material which goes towards the secretion of pearly substances; the excess of which over and above what is required for the nacreous lining of the shell is precipitated in the form of a pearl, much as in the analogous case of a man a calculus is formed in the kidney or bladder, or a concretion of urate of soda above the knuckles.

RARE LIVING OBJECTS.

At a recent monthly meeting of the Microscopic Society of Liverpool, Captain John A. Perry, associate of the society, exhibited two living diamond beetles (*Entimus nobilis*): these he had procured at Rio de Janeiro, Brazil, and they were unusually large and brilliant. They are doubtless the first living specimens ever brought to England—if not to Europe—and were specially obtained for the purpose of being exhibited alive to the society. There had been great difficulty in keeping them alive, on account of the great difference of temperature between the Brazils and England. These beetles were taken from their native clime during the height of the Brazilian summer (January), with the sun nearly vertical, and the thermometer registering 110° Fahr. in the shade out of doors the day they were procured; whereas in England at the time they were exhibited, the thermometer indoors was about 38° Fahr. Captain Perry has been also successful in bringing home, on previous voyages, many rare *living* fish, most of which have not before been seen alive in Europe. They included one *Pomotis* (?), twelve *Pœcilia unimaculata*, and seven of a species new to science, called by the natives *Carà*. The above are from the Brazils, and from the Rio de la Plata. He has also succeeded in bringing home thirteen living *Callichthys asper*, and two *Piramutana Blochii*. All these fish (many others having died during the voyage) were brought home expressly for the aquarium of the Free Public Museum, Liverpool, where they lived for some time, until attacked with a fungoid growth, which has from time to time killed them off, so that at the present time, out of the thirty-five brought home alive, not one remains. Captain Perry is quite prepared, as the warm weather sets in, to bring home others; having already secured a stock in a healthy condition at Rio de Janeiro. The fungoid growth that attacked and killed the above fish, as also many other valuable foreign fish belonging to the Museum, was the subject of an interesting communication by the Rev. Mr. Bannister, at the meeting of the Microscopical Society, which was discussed by the Rev. Mr. Dallinger and other members. Mr. Dallinger had devoted some time to the study of this particular fungoid growth, which he found to be not only superficial, but to ramify into the flesh and even into the vitals of the fish. Many of the readers of Science-Gossip are also indebted to the above gentleman (myself among the number) for portions of his Porto Seguro and Rio de Janeiro gatherings, both of which were rich in rare and beautiful species of Diatomaceæ.

F. Kitton.

HERBARIA.

Although various have been the suggestions made by the students of botany with regard to the construction of an herbarium, it seems somewhat strange that the not less important matter of mounting the specimens should have been so generally overlooked; for, as a rule, where any reference at all has been made upon the subject, I have observed that paper has, in most instances, been the material recommended for this purpose. At this I cannot but express my surprise, especially since I have learned, by experience, that no plant of such delicate structure as those found comprising an herbarium can well be preserved from injury on so thin a substance; and this, I think, will become the more apparent when the extreme crispness of plants in their dried state is considered, and how, therefore, they are the more easily rendered imperfect by the slightest of causes, but which is most frequently of all due to the neglect of so apparently a minor point as the one

just indicated. I venture to suggest that if paper were superseded by the substitution of card, a great improvement would be effected, chiefly because the latter would admit of having a slightly raised border put upon it; by which means the specimen would be saved from undue pressure and contact. For the purpose of storing away the specimens when mounted, I would recommend that a box be made, of either wood or card, capable of holding 100 of them, the length and breadth of which must (within an eighth of an inch) correspond with those on the mounts. By adopting this plan, sufficient room will thereby be allowed for easy removal, besides, at the same time, being light enough to prevent their shaking about, and from getting confused when packed. To facilitate their withdrawal, at pleasure, I would have at the end of each card—in the centre—a small space cut, just large enough to admit of the finger and thumb, so as to guarantee their removal without fear of injury.

Newcastle-on-Tyne. JOHN HARRISON.

RECORDS OF THE ROCKS.*

WE have experienced few pleasures more genuine than that of reading through the volume whose title stands above. Its author is a well-known worker in the geological field, and his pen has done much towards rendering geology popular. In this book, however, Mr. Symonds has certainly transcended all his previous efforts. It is undoubtedly a good book, bearing rich evidence on every page of its being a labour of love. The author has selected those chapters of the geological record with which he is most familiar, as illustrated in districts to survey which has been the object of repeated holidays from a country clergyman's work. The archæology and botany of the localities investigated have been charmingly interwoven with the geological narrative, so that the reader can now understand how a book written in pleasant and racy English has such a charm. Our first thought, as we read chapter after chapter, was, that the different spots, whose palæontological and natural history treasures were opened out so invitingly, should certainly be those selected for our own limited summer ramble. And that notion, thanks to Mr. Symonds, we shall certainly have to indulge before we obtain peace. Nothing could be more attractive or profitable than to take this volume with us as "guide, philosopher, and friend," through North and South Wales, and the Western counties of England. Silurian geology has always had a peculiar charm for ourselves. It is to be studied in the most picturesque spots, on the flanks of genuine mountains, or on the sides of hills almost deserving the name. Where its fossils are to be disentombed, there you may expect to meet with many a rare plant not to be obtained elsewhere. A feast of fat things to the naturalist is generally spread over Silurian strata. And when, in addition to these attractions, the same localities are fruitful in archæological lore, in grey ruin, and prehistoric remains—the student has to confess that he might go farther and fare worse than work ground so attractive.

Such is the nature of the district whose geology is now popularized by Mr. Symonds. It is classic ground to the geologist, for it is the "Siluria" of Murchison! Mr. Symonds has followed in the steps of the great master, and has thrown the charm of a pure literary style over his descriptions. The illustrations of the work are numerous and excellent, although some of the fossils bear a familiar appearance. By far the best sketches in it are those from the pencil of Sir William Guise, Bart., who is himself well known as an able naturalist and geologist. We have rarely seen anything more effective than the frontispiece, "Eligug Stacks near Pembroke." None but a true artist, as well as a genuine naturalist, could have produced such a sketch. Fig. 52 is a good example, although not the best, of Sir William's pencil. It expresses the influence of physical geology upon the scenery in a remarkable manner. It is not at all difficult to see that two geological formations meet here, and that the bay has been scooped out near the junction.

The "Stiper Stones" are a well-known ridge of quartzose rocks, which have been repeatedly sketched. They are now known to belong to the Lower Llandeilo rocks. How they have withstood the weathering, so as to present the appearance of some ancient ruin, is well seen in the following sketch. The district round about is full of proofs of plutonic disturbance. Dykes of greenstone ramify through the ancient strata, in which latter the tubes of marine worms are still to be identified. Bosses of trap stand out, the softer strata through which they were thrust having been slowly worn away since the disruption. No wonder the scenery of such a district should be wild and varied.

Summer pedestrians, who like to flavour their holidays with a little natural history recreation (and we are glad to think the number of such is increasing), will thank Mr. Symonds for the full catalogue he gives, not only of localities where fossils are to be obtained, but of the fossils themselves. The places where evidences of glacial scorings and striations, where moraines with angular, glaciated rocks are still to be seen, and where the ancient elevated beaches containing shells—baro-

* "Records of the Rocks." By Rev. W. S. Symonds, F.G.S., Rector of Pendock. London: John Murray, Albemarle Street.

Fig. 52. Marloes Bay, Gateholm, and part of Skomer Island.

meters to show the depth to which this country was submerged during the last great depression of the glacial epoch—are indicated with a clearness and fulness that leave little to be desired. The perplexed geology of the Snowdon district, so ably worked out by Ramsay and others, is here simplified to the hand of the student, as the accompanying section (fig. 54) across the Snowdon range will show. Mr. Symonds has a peculiarly apt style for the illustration of physical geology, but he seems to be himself most interested in the organic remains of the rocks. How interesting the Silurian fossils are, especially of the upper rocks, we need not stop to point out. Not the less instructive and important are those of the Lower Silurians, and especially of the Cambrians, as the recent researches of Mr. Hicks have sufficiently proved. In the limestones of the upper strata, the encrinites are preserved with a freshness and distinctness seldom seen in rocks of later date, and the figure now given is not a whit exaggerated in its delineation of their appearance. Most lovely objects were these ancient organisms, ornamented in a style that we might do well to copy from, and study, and apply to the arts. Their slender, many-jointed, yet strong columns,

Fig. 53. The Eastern Face of the Stiper stones.

supporting heads formed of plates mosaicked together, and terminating in a living network of fingers or meshes, are among the most familiar fossils of the upper Silurian limestone rocks. Not less wonderful as showing the degree of differentiation which had already gone on, and as illustrating, how, when a

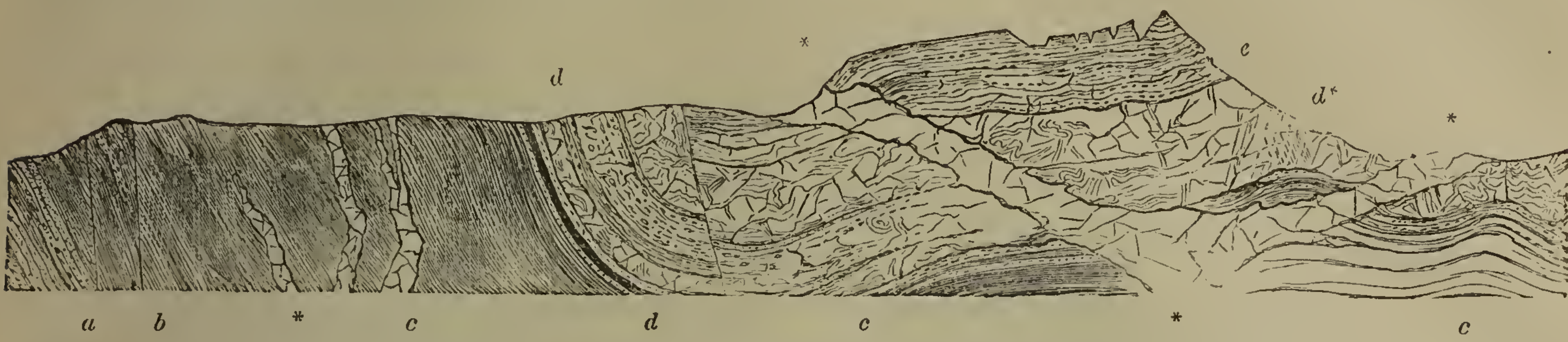

Fig. 54. Section across Snowdon Range. *a*, Cambrian grey and purple grits and slates, much dislocated and supporting Lingula flags. *b*, Lingula flags faulted. *c*, Slates (Llandeilo), dark grey, traversed by eruptive dykes,* (the bedding almost obliterated) followed by *d*, bluish-grey and brownish sandstone and slate (Lower Caradoc beds), with felspathic ashes and volcanic grit, *d** *e*, Upper part of the Caradoc (or Bala) beds, fossiliferous, with calcareous and felspathic ashes.

mechanical or physiological contrivance has reached a certain stage, the idea becomes stereotyped—are the fossil star-fishes from the same beds. We have seen specimens as perfectly preserved, and with all the ambulacral perforations as distinct, as in recent species. The following group (fig. 56) give a good illustration of the manner with which the "Geological Record" has done its work in preserving the organisms of some of the most ancient seas of the globe.

We finished the last pages of the book with regret, but still with the determination, by-and-by, to turn them over again. We cordially recommend it as a book likely not only to profit the student and pedestrian, but stay-at-home people, who like to know what is to be seen in the world without their going to see it.

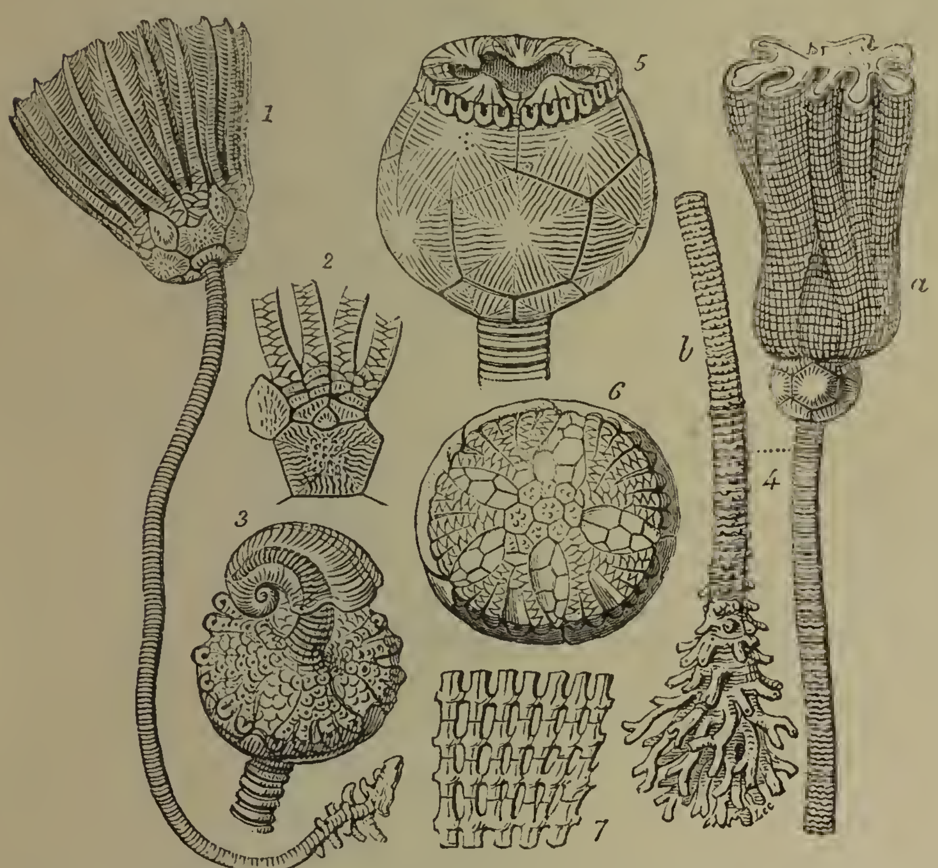

Fig. 55. 1, Marsupio-crinites cælatus; 2, Magnified base of the arms; 3, Proboscis of the same inserted in the shell of *Acroculia haliotis*; 4, Reduced figure of Crotalo-crinus rugosus; the bag-like cluster of arms surmounting the small round pelvis; 5, the latter, of natural size, with the stomach-plates stripped off, and showing the base of the many-fingered arms; 6, the flat stomachal surface, showing also the branching of the arms from their bases; 7, a part of the reticulated congeries of fingers, each joint being anchylosed to its neighbour on either side.

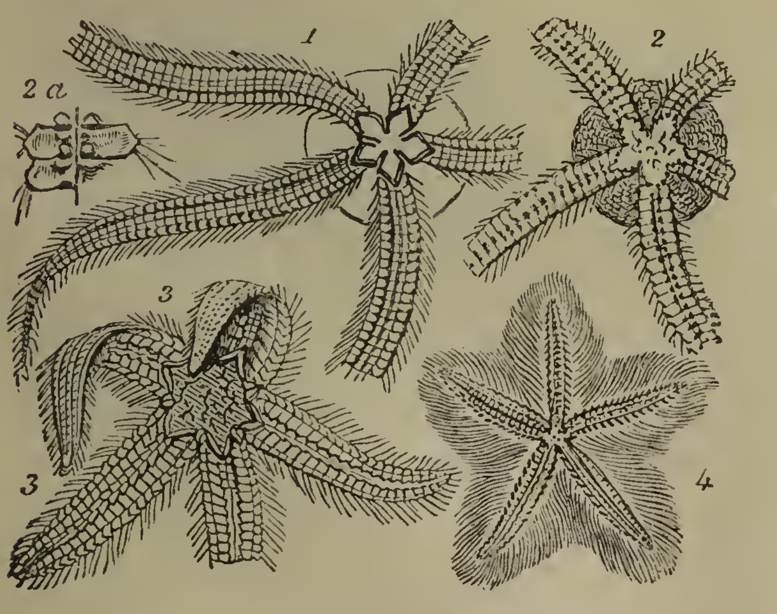

Fig. 56. Fossil Star-fish from Lower Ludlow Rocks; 1, 2, Protaster Miltoni, a form of Ophiuridæ with numerous plates; 2 *a*, small portion of a Protaster magnified; 3. Palæocoma Marstoni; 4. P, Colvini. These are star-fishes allied to Palmipes and Pteraster.

MICROSCOPY.

Dark Lines in Field of View.—I feel it a duty to reply to your correspondent "G. W." (in Science-Gossip for last month, page 63), relating to the question why the higher powers do not work so satisfactorily with the binocular arrangement as the lower ones do. The fact is, that an inch is about the highest power that can be well used with the *usual* arrangement; that is to say, the prism fixed at the bottom of the *eye-tubes*. But when we wish to use higher object-glasses, as ¼, ⅛, &c., we must either have our object-glasses made *very* much shorter, so as to bring their lenses much nearer to the prism, or, what is still better, have a small prism fixed in the tube of the object-glass itself. I have an ⅛th thus made, which performs admirably, showing a perfect field; but the prism is not more than about the ⅛th of an inch in size, and fixed closely to the back lenses of the "objective;" being

regulated by the pressure of a screw acting against a spring, at the end of which the prism is fixed. By slightly turning this screw, the prism may be regulated so as to throw an exactly equal amount of light up the two eye-tubes. Your correspondent says he sees a "dark line" across the field; and then says he finds the outer halves of the field dark. The latter is the fact. The high powers, with common prism, exhibit only the central part of the field, and obliterate the sides. Thus, when I use a common ⅛th with common prism, I have only a narrow strip of light through the centre of the field; but when I remove it and adopt the ⅛th with *internal* prism, all is perfectly right. In short, if your correspondent wishes to use his ¼ with the common prism, he must have the tube greatly shortened, so as to bring the prism and lenses as near together as possible. Mr. Wenham, the inventor, long ago fully explained all this in the *Monthly Microscopical Journal*.—*J.*

Dark Lines in Field of View.—"J. W." would find a condenser, and a piece of fine ground glass below the slide, would remedy the defect complained of, and add very much to the stereoscopic effect. My own condenser consists of a plano-convex lens of ½-inch focus, and a brass cap screwing over it, to which a disk of ordinary thin glass (ground on the under side) is attached by means of marine glue or asphalte varnish. The thin glass I grind on a piece of plate-glass and flour of emery, mixed with a little water. By this means I can use a ⅛ objective without withdrawing the prism, and both tubes are fairly illuminated.—*F. K.*

Thiersch's Cement for Objects mounted in Resinous Substances.—Dissolve shell-lac in spirit of wine, in sufficient quantity to make a thick varnish; colour with a concentrated solution of aniline-blue or gamboge in absolute alcohol. Add about a scruple of castor-oil to each ounce of the mixture. After some further evaporation, it must be preserved in a well-closed vessel. Previous to using this cement, the inventor directs that the edges of the covers of balsam-mounted slides should have a layer of balsam dissolved in chloroform put round them, in the same manner as asphalte; and at least three days, but, still better, weeks or months, should be allowed to elapse before applying the cement. (*The Microscope*, by Dr. Frey.) (I have used for some time dammar solution, coloured with vermilion, zinc-white, emerald-green, &c. If the object is mounted in soft balsam or dammar, a layer of ordinary shell-lac varnish should be previously applied. If the object is mounted in a thick cell, the angle between the cell-wall and slide can be filled up with whiting, mixed with gum-water, and the coloured varnishes afterwards applied.—*F. K.*)

Blood Crystals and Hydro-chlorate of Hæmetin.—Bojanowski recommends the following plan to procure the ordinary form of blood crystals. The blood should be taken from the vessels of a dead animal, and kept in a vessel two to four days in a cool place. A drop of this fluid is to be put on a slide covered, and exposed to the light for a few hours. The crystals may then be seen. The formation of crystals takes place readily in electrified blood; in that from the guinea-pig their formation is so rapid that they appear as though struck out by the spark. Böttcher says that chloroform, with access of air, produces blood-crystals. Lehman gives the following directions for the production of crystals of hydro-chlorate of hæmetin:—Fresh blood should be treated with alcohol, containing oxalic acid and ether (1 part alcohol, 4 parts ether, and $\frac{1}{10}$th of a part of oxalic acid). Preserved in well-closed bottles, the crystals are gradually precipitated: the process is hastened by the addition of chloride of calcium, liquefied by exposure to air. When separation takes place quickly, the crystals are more or less acicular; if slowly, they are either hexagonal, or long, narrow, and laminated, and appear sometimes twisted on their long axis.—*The Microscope, Dr. Frey.*

Cements.—There is a neglected varnish, which I should like to recommend to your readers who mount their own objects; namely, copal. It can be bleached by exposure to the light for a few months, and when old and good, makes a cell for liquids or glycerine, which is so clear that it looks like a balsam slide; and, when allowed time to set before using, as near imperishable as can be needed. One point should be observed in this, as in other mounts, I think. Whatever cement be used for the cell, the same should do for the covering and finishing. If a picture were laid in with one vehicle and finished with another, it would certainly crack all over some time or other, owing to the different rates at which different media absorb oxygen. I have cells of copal, deep and shallow, glass rings, &c., cemented with it, which show no deterioration since 1861.—*G. W.*

Mounting Diatomaceæ.—Your correspondent C. L. Jackson will find the mounting of diatomaceæ and other minute objects in balsam greatly facilitated by the use of a little instrument devised by Mr. James Smith, and supplied by Mr. Collins, of Great Portland-street, London. This consists essentially of a small brass plate turned up at the edges, on which to lay the slide, a handle to hold it by, and an ivory knob, so arranged on a lever that it can be brought down on the covering glass with a steady graduated pressure, by means of a fine screw. This instrument may be used as follows:—The slide, with the objects arranged on it in any pattern that may be desired and covered with a

piece of thin glass, is placed upon the brass plate with the centre of the covering glass immediately under the ivory knob. The knob is then screwed gently down sufficiently firmly to hold the covering glass steady. The slide is next warmed over a spirit-lamp, there being an opening in the brass plate to admit of this being more readily done, and a drop of Canada balsam being placed at the edge of the glass cover, is drawn in under it by capillary attraction, entirely surrounding the objects without disarranging them, and completely excluding air-bubbles. If it be desired to avoid the application of heat, a solution of Canada balsam in chloroform or benzole may be applied in the same way without the use of the spirit-lamp. It would doubtless be possible to mount diatoms, &c., arranged in patterns, without the aid of Mr. Smith's little instrument, by proceeding on the same principle, but employing only one of the ordinary wire clips. The disadvantages of this would be that the pressure could not be graduated with sufficient nicety, and the hold upon the slide and covering glass would be of so unstable a character as to be displaced by any sudden movement; thus destroying at once the symmetry of the objects and the patience of the operator. I am very much afraid that the pressure of the cover without that of the mounting instrument would smash any but the stoutest diatoms: fancy pressing *Coscinodiscus concinnus* or the Pleurosigmas.—*R. C. M.*

A Polariscope.—Will any of your readers kindly inform me where I can find a figure and description of Mitscherlich's polariscope? The instrument is referred to in Drs. Dupré and Thudichum's treatise on wine, as useful in estimating the amount of sugar in wines. This instrument effects this by ascertaining the amount of rotation imparted to a ray of polarized light in passing through the sample of wine under examination. Perhaps some one can kindly give me a hint how to fit up, cheaply and simply, a polariscope for estimating the quantities of sugars in various solutions.—*F. M. S.*

Soft Balsam.—My old friend and teacher, the late Dr. Arnott, of Glasgow, always strenuously objected to the use of soft balsam, or rather to putting on the cover before it had been hardened. I have now before me one of his letters, written in 1858, where he says, "Pray harden the balsam before putting on the cover; the pressure upon your marked slide has either slipped the cover or the object; bear in mind balsam never hardens beneath the cover, and if slides mounted in that way are sent to a hot climate they would be useless." I have just removed the cover from a slide mounted twenty years ago, and the balsam is now soft enough to adhere to the fingers. I do not quite understand Mr. Walmsley's directions; for instance, he says, "Make a saturated solution of balsam in pure benzole until it is of the consistency of rich cream." Now as balsam is soluble in benzole in all proportions, a solution of the consistency of cream cannot be said to be a saturated solution. In another place he says, "a drop of balsam is to be placed upon it, followed by the usual *core;*" and a few lines further on he again alludes to a *core*, whatever this may be.* Although oil of cloves possesses some advantages over turpentine, it evaporates so slowly that the balsam surrounding the objects on the slides sent to the editor is as soft now as when the cover was put upon it. A further proof of the softness of the balsam beneath the cover is the tendency of coloured cements to run in, and which Mr. Walmsley avoids by using the balsam as a finish. My hard balsam slides have either a ring of asphalte varnish or a mixture of dammar varnish, gold size, and vermilion, and no running in has taken place, although they are placed in racked drawers. Another and important difference exists between soft and hard balsam: their refractive powers are not alike. If a valve of *Pleurosigma Balticum*, for example, is mounted in soft balsam, it is scarcely visible, and no trace of striation can be detected; but if the balsam is hardened, they are easily resolved. If Mr. W. has had the number of slides sent to him for the purpose of naming that I have had, and seen the damage done to them by the pressure of one slide upon another, squeezing out the object with the soft balsam, he would have the same horror of it that I have.—*F. Kitton.*

BOTANY.

Isoetes.—Is there not some little confusion in the account of *Isoetes* in the March number of Science-Gossip? According to the latest authorities, the British species are,—1. *I. lacustris*, L.; 2. *I. echinospora*, Durieu. This is the rarer form, and according to Hooker ("Student's Flora"), is only a sub-species of the preceding. These are the aquatic species. 3. The terrestrial: *I. hystrix*, Durieu (not *histrix*), of which *I. Durieuæi*, Hooker, is a synonym, occurs in Guernsey, at L'Ancresse Bay. Its so-called "spines" are the old leaf-bases, which are "spinescent, dark, horny, and consist of lateral subulate processes, and an intermediate tooth." If by "seeds" the *macrospores* of *Isoetes* are intended, it is perfectly intelligible, that, in the absence of the *microspores*, no result could have followed from their being sown.—*R. A. Pryor.*

British Orchids.—Scarcely a number of Science-Gossip appears without containing some reference to our native Orchids. This fact testifies

* Query "Cover."—(Ed. Science-Gossip.)

to the great interest which Darwin's treatise on their fertilization has awakened amongst all students of nature. Seeing that very few people are fortunate enough to be able to procure specimens, I am sure it would be a very great boon to your readers, if some of your correspondents will give us some plain hints *how to cultivate them.* That it *can* be done successfully, the experience of Mr. Needle, gardener to the Comte de Paris at Twickenham, has abundantly proved. What I and, no doubt, many of my brother readers, long to know, is, how to do it.—*F. M. S.*

New British Riccia.—In the March number of *Grevillea,* Dr. Braithwaite describes *Riccia sorocarpa,* Bischoff, as having been found by Mr. B. M. Watkins last spring, growing in tolerable abundance on a projecting limestone rock overhanging the Wye, between Ross and Monmouth.

Drying Orchids.—It would be a great assistance to collectors of orchids if those who have taken pains to preserve them would give to others the benefit of their experience, and in order to set the example, and in the hope that it may lead to further information, I will state the results of my endeavours. I have almost invariably observed that orchids, when dried in the ordinary way, turn either black or dark brown; in fact, retain nothing but the form, and even that in many cases indistinctly. My plan has been to immerse them in *boiling* water nearly up to the flower-head, so as to *cover all the leaves,* for about a minute,—long enough, in short, to *kill* the plant,—which is then dried on a cloth, and put on paper, and, carefully spreading out the *flaccid* leaves with a small paper-knife, pressing and drying it in the ordinary way. By this means I have always preserved the colour of the leaves and stem, and generally of the flower also. If an incision be made in the tubers, it will greatly assist in killing the plant,—a plan I have often adopted in preserving many of the *Liliaceæ.* My orchids are nearly all foreign,—from Switzerland, South of France, Italy, Sicily, Algeria, and the Pyrenees. The late Joseph Woods, author of the "Tourist's Flora," when he saw them, thought the climate must have had something to do with the preservation of the colours, but was assured it was not so. I need hardly add, a dry warm temperature is necessary for the better preservation of orchids, as it is with all plants.—*T. B. W.*

Sheffield Naturalists' Club. — The first meeting of this society was held in the Cutlers' Hall on the 6th of February. The members have been fortunate in having Mr. H. C. Sorby, F.R.S., who is so well known for his researches in microscopic geology, for president. On the above occasion, he delivered an elaborate address, in which he pointed out his views with reference to the formation of such a society, and the influence of the cultivation of natural science on the human intellect. Mr. Edward Birks afterwards followed with a capital paper on the botany of the district. Such a society was much needed in Sheffield, and we have little doubt as to its future success.

ZOOLOGY.

Small Birds' Protection Act.—We feel confident all true lovers of natural history will rejoice that this piece of tardy justice has at length been conceded to our Feathered Friends. The following paragraph relating to it is from *Land and Water* of Saturday, March 15th :—"From and after Saturday, any vagabond lurking behind the garden fence with a stuffed chaffinch, a call-pipe, and a clapnet, may be at once taken before a magistrate, and fined 5s., with an additional sum for each miserable captive in his possession. Any game-dealer who sells, or exposes for sale, the lean, broody birds which have long been a disgrace to the market, may be fined 5s. for every bird of the duck or plover tribe on his counter. The matter is now in the hands of the public, and we confidently promise them that if they will individually exert themselves to carry out the provisions of the Act, the result in two years will be, to the owners of surburban residences, an accession of feathered songsters, whose notes from long disuse are forgotten, but which will add a charm to their country residences that can hardly be over-estimated; to the agriculturist and market gardener a costless riddance of mischievous insects; and to the housekeeper a reduction of 50 per cent. in the price of one of the greatest delicacies which come to table—wild fowl."

New British Ichneumons.—The Rev. T. A. Marshall has described, in the March number of the *Entomologists' Monthly Magazine,* two new species of Ichneumon, under the relative names of *Anomalon fasciatum* and *Mesostenus maurus.* The latter was taken in the neighbourhood of Carlisle. The former is not only new to Britain, but hitherto unknown elsewhere.

Cleaning Feathers and Skins.—I am obliged to "South Australian" for the recipe for cleaning feathers and skins, which will prove very acceptable to some of the readers of Science-Gossip, as well as myself; but 'tis not what I wished to know in answer to my question, which was, how to clean birds when stuffed, which had got dusty and dirty by being exposed in unglazed cases. I think the steeping process would have the tendency to alter the shape of the birds. Perhaps "South Australian" will say if the process will answer in the case of birds that are stuffed.—*W. K.*

New Lepidopterous Insect.—In the *Entomologist* for February, Mr. C. S. Gregson gives a description of a new lepidopterous insect bred by Mr. Roxburgh. Its expanse of wing is from seven to nine lines. Its larva fed upon the remains of old Lepidoptera in a neglected drawer. It is not known how the eggs came there, but it is suspected that they were introduced with dried fruits. He proposes to call it *Ephestia Roxburghii*, after the name of its finder.—*Claude Ryan.*

Stings of Wasps and Bees.—In your number of February, pages 44 and 46, allusion is made to the stings of queen-bees and of wasps. I beg to add a word in reply to E. T. Scott regarding the latter. "R. H. N. B." alludes to "the tube running down the blade of the sting; but is that for economy and strength, like a quill, or to convey the poison?" My answer would be both, and for the following reason:—As I was cutting up a queen-wasp a week or two ago, to mark the differences between queen-bee ovaries and those of the queen-wasp (whilst *hybernating*) the sting was closely followed out, as I was anxious also to prove the strength of the two stings; and when I applied the wasp sting to my finger the mechanical action was soon discovered, it stuck at once and came out like a stiletto at the bottom of the sheath, but at an angle. If the tube be pressed at the thick end, the dart comes out instantly, and is retracted when the pressure is removed from it, and there is no question the poison is injected at the same moment; but I was not anxious for any "experimental philosophy" on my own flesh. I tested the act with litmus-paper; the result was of course without evidence of discolorization, as the sting had been removed from the killed queen-wasp, and the poison-bag had been detached. Of the stinging of living wasps, I have no doubt from past experience, the sting is withdrawn by working against the sheath; not so the sting of the worker-bee, as already shown by you.—*W. A. Munn.*

Union of Natural History Societies.—The Committee of the Birmingham Naturalists' Field Club suggest the desirability of similar societies in various parts of the country uniting in a system of correspondence for the purpose of exchanging lists and specimens, and invite opinions as to the best method of carrying this idea into practice.

Don't neglect the Flies!—It has been recently remarked that the overwhelming proportion of entomologists not only neglect to collect the numerous insects of the dipterous order, but also pass them by as unworthy of notice. On the European continent, we are told, these are a favourite study, and yet I suppose our French and German brethren have just as much reason to regard flies with dislike as we have; for there is no question that we have, to an extent, an instinctive antipathy to these insects, on account of the annoyance some species inflict upon us. Still we ought to remember, as Mr. Walker, the well-known dipterist observes, "That a large part of them are especially useful in the development of flowers, and thus advancing vegetation, and in promoting the healthiness of a climate by removing what has an opposite tendency."

Larvæ and Ichneumons (p. 283, last vol.).—The Microgaster which usually attacks the larvæ of our common white butterflies (*Brassicæ* and *Rapæ*), deposits so many eggs upon the body of its victim that I believe when these hatch, as they almost invariably do, the insect perishes before it can become a pupa. There have been instances, however, where larvæ attacked by parasitic enemies have struggled on in spite of them, and ultimately developed imagos, which were partly crippled. It is obvious that in such individuals the attacking larvæ could not have penetrated any vital part. Some entomologists have succeeded in killing the germs of life in parasitic eggs deposited upon larvæ by nipping them carefully, the slight wound made soon healing up.—*J. R. S. C.*

GEOLOGY.

A Missing Link.—Professor Marsh has added to his descriptive account of the strange fossil bird met with in the Upper Cretaceous shales of Kansas, and which he has included under a new sub-class termed *Odontornithes*. We have already referred to its piscine form of bi-concave vertebræ (Science-Gossip, page 43). Further investigation has shown this "missing link" to possess other characters, which separate it still more widely from all known recent and fossil forms. The specimen *had well-developed teeth in both jaws!* The teeth were numerous, and implanted in distinct sockets; small, compressed, and pointed. The jaws were apparently not encased in a horny sheath. It is on account of this possession of teeth that the Professor has established for this extinct type the sub-class of *Odontornithes*, or "toothed birds." He suggests that the *Archæopteryx*, whose reptilian affinity was shown by its having a long slender tail like a lizard, may have had teeth in its jaws also, and been the possessor of bi-concave vertebræ. At any rate, this "new find" does much, as Professor Marsh shows, to break down the old distinctions between birds and reptiles. The *Archæopteryx* of the Oolite had already done a great deal; but the *Ichthyornis dispar* of the Kansas chalk has done considerably more to remove the hard-and-fast lines between two great divisions of the animal kingdom.

New Fossil Mammal.—There are few palæontologists who have worked with greater assiduity than Professor Marsh, and his labours on the Tertiary

strata of the United States show what "missing links" may yet be brought to light in other parts of the world, if all were equally well worked. One of his last discoveries, in the Eocene of Wyoming, is an entirely new form of mammal. With the size of an elephant it combined many of the features of the rhinoceros, but had, instead of one or two median horns, six, in pairs, arranged one behind the other, the front ones being just at the tip of the nose. A large pair of canines and an absence of incisor teeth were also peculiarities of this extraordinary animal, which has received the name of *Dinoceras*.

THE WOODWARDIAN PROFESSORSHIP.—We have much pleasure in announcing that Mr. Thomas M'Kenny Hughes, M.A., of the Geological Survey, has been elected Woodwardian Professor of Geology in the University of Cambridge, in succession to the late Professor Sedgwick.

PROF. HYATT, of Cambridge, Mass., by means of sections of the central spirals of Ammonites and Goniatites, has been able to obtain some valuable results on the subject of the embryology of Fossil cephalopods. He finds that the shell in its first stage is represented by a globular sac, which is not retained in Nautilus. Into this sac opens the first whorl of the shell, and the others are coiled round it. Prof. Hyatt has endeavoured to prove that the series of forms, so well known as depending on the amount of coiling or uncoiling of an elongated cone, is epitomized in the life of the individual Nautilus or Ammonite, the young being at first uncoiled, and the different degrees of coiling up finding a permanent expression in the genera of Ammonitidæ. —*Nature*.

NEW PTERODACTYLE.—The *Athenæum* states that a specimen of the *Pterodactyle*, the flying lizard of the secondary rocks, has been recently discovered in the quarries of Eichstatt, in Bavaria, which is believed to be unique. The integument of the wing has been found, for the first time, in a fine state of preservation.

NOTES AND QUERIES.

SIMETHIS BICOLOR.—The rare plant *Simethis bicolor*, inquired for in the January number of SCIENCE-GOSSIP, was certainly growing in at least one locality near Bournemouth in 1864. I have a specimen gathered from an inclosure in the grounds of Branksome Tower, to the right of the carriage road, about midway between the house and the gate nearest Bournemouth.—*H. M. A.*

SPIDERS.—In a recent number I saw some interesting matter relative to spiders and their poisoning apparatus. The following, which comes from personal observation, will vouch for the efficacy of this apparatus, and also show what a weapon of defence it becomes when the parental instinct is roused by an attack upon the offspring:—One day in the autumn I captured a fine specimen of the garden spider (*Epeira Diadema*), which was running over a flower-border, skilfully conveying the precious filmy bag of eggs underneath its body over the various obstacles which impeded its progress. It did not seem averse to the shelter afforded by a small wooden box, and remained at one end with its treasure so contentedly that I left it for a few moments, and placed it on the top of a dahlia-pole. On returning, I discovered that an exploring party, consisting of four ants, was scaling the wall of the fortress. Until they were fairly within its walls, the spider appeared unaware of their approach; and in fact until a forcible attempt was made by the intruders to grapple with the egg-bag, it remained strangely apathetic. But this insult offered to the helpless young was too much. It darted forwards, and assailed the foremost. It was a tough fight—four to one; but the valiant mother conquered in the end; for three of the invading foe lay dead (evidently poisoned by a venomous bite), and the fourth was fairly driven off. The victor then retired with her insulted property to a corner, and I carried off the box. An untimely escape prevented an experiment I hoped to make; viz., of trying to tame this member of the usually disliked *Araneidæ* family.—*F. C. Rawlins.*

TUSSILAGO PETASITES.—Your correspondent, S. Smith, confounds the *Tussilago petasites*, or Butterbur, a common British plant, with *Tussilago fragrans*, or Fragrant Coltsfoot. The latter (*fragrans*) was brought me in full flower on New Year's Day, from Walton-on-the-Hill. The scent was exceedingly powerful, like that of the Heliotrope, and was called, like it, "Cherry Pie." The *Petasites* has no scent and much larger leaves. I may add that the *T. fragrans* alluded to had evidently been thrown out from some garden, as it is not a British plant; and when once introduced it becomes of troublesome growth.—*W. T. Iliff.*

DIFFERENCE BETWEEN LARVÆ OF A. CAJA AND A. VILLICA.—Thinking that some young entomologists may not know how to distinguish the larvæ of *A. caja* (common Tiger-moth) from those of *A. villica* (Cream-spot Tiger-moth), I beg space enough to describe the differences which I have noticed. The great difference lies in the colour of the head and legs, which are red in *villica;* while in *caja* they are shiny black. The colour of the hair with which they are covered is in *villica* dark sooty-brown; but in *caja* it is of a warm yellowish-brown tint, tipped with grey. Again, the larvæ of *A. villica* appear much earlier after hybernation. For instance, I have found larvæ of *villica* in the middle of March over an inch long; but I have never found *caja* until the middle of April, and even then they were quite small—about half an inch in length. The larval food-plant of *A. caja* is said to be blind-nettle, and that of *A. villica* chickweed; but my own experience shows that neither is at all particular in this respect, as I have found both on dock, blind and dead nettles, groundsel, chickweed, and the early leaves of teazle; but by far the best food is dock, and it is possibly easier to provide.—*Claude Ryan.*

LARVA OF THE GOAT-MOTH.—September seems to be the month when these larvæ occasionally quit their mines, and wander from tree to tree. It is only, I believe, in the last autumn of its larval life that it thus migrates, possibly because it is parti-

cular as to the quarters in which it takes up its winter residence, when this larva usually remains without food. One may even be seen crossing a highway, and thus exposing itself to various dangers, especially as it is tardy in its movements. The larva of the Goat-moth can sustain the absence of food for a long time. As an instance, one of these was kept in a box without food for nearly a year, and at the end of that time it was alive, but very languid and wasted, too bad to recover itself. —*J. R. S. C.*

The Oldest Tree.—Can any of your readers tell me which is the oldest tree in Great Britain, its age and species, and where it grows? Yew-trees reach a good age; for there is one still living at Gresford, near Wrexham, North Wales, which is said to be 1400 years old, and measures 34 ft. in circumference.—*C. H. R.*

Ravages of Zeuzera Æsculi (Leopard Moth).—The account given by Newman in his "British Moths" is supplemented by a much fuller description of the larva and its ravages in the *Entomologist*, vol. ii. p. 92. He admits there that the species is frequently destructive to young trees, and cites an instance where in one district in Kent it destroyed, in 1862, ash poles to the value of a thousand pounds. But he still maintains, and, as I think, correctly, that the Leopard rarely destroys large trees, though it may, as I have often witnessed, cause their branches to perish and fall off, when the mines have been carried along these. I have no doubt the instance given by Mr. Lefroy (p. 236, vol. viii.) is a clear one against this insect, yet one rather exceptional, as I imagine. Mr. Newman remarks that the stimulus it give to fruit-trees is very notable in some instances, the fruit-bearing power being greatly increased; yet that is not necessarily a proof that the tree is in health.—*J. R. S. C.*

The Singing Mouse.—Having read during the past year accounts of the singing mouse, I send you the following from my own observation. During the summer of 1862 or 1863 (which I am not positive) I was occupied at my office at Newport, Monmouthshire, when I heard what at first seemed a bird's warble, and having caught several birds that had found their way in, I hunted for the cause of the sounds. Being pretty distinct, I traced them to a cupboard where several unused articles were kept. An old office-coat hung near a shelf, and from the pocket of the coat came a mouse, which ran up the coat on to a shelf. The mouse appeared very tame, and, instead of making away as mice usually do when disturbed, took a deliberate look at me, raised its little head, and warbled a low, soft "tootle-tootle" kind of song, continuing some seconds. I was so near as to distinctly notice the movement of the throat during the song. I afterwards took some cheese-rinds, and placed them handy for my visitor. I frequently heard it afterwards, but it did not grant me the pleasant interview again. I spoke of it to our foreman, calling his attention to it when I heard it one evening: he heard the warble, but would not be convinced it was a mouse unless he saw it.—*J. J. M.*

Botanical Nomenclature.—There is required a thorough revision of botanical nomenclature, and it is greatly to be regretted that some committee of leading botanists does not meet for the purpose, and as a result, issue a standard work, from which all obsolete and useless names should be excluded, and only those employed which the advanced state of the science at the present juncture requires. Here, for instance, is a plant which is called indifferently—*Petasites fragrans*, *Tussilago fragrans*, and *Nardosmia fragrans*, although no one doubts it to be a *Tussilago*, and so closely related to *T. petasites* as scarcely to make it worth one's while distinguishing between them, except for the sake of the nomenclature of the science. As Mr. Harkness suggests, the specimen I mentioned may be an "escape;" but against this supposition stands the fact that the plant grows in a spot entirely remote from any garden.—*Sam. Smith, M.R.C.S.E., &c.*

Stings of Wasps.—I have read with much interest the remarks of your correspondent H. P. Malet, and also the paper by Dr. Mills (Science-Gossip, March). Still I do not think the question is quite settled. A further examination of one of my specimens, prepared almost precisely according to Dr. Mills' suggestions, discloses what appears to be a fine thread-like duct running down the tubular portion of the lancet, nearly as far as the extreme point of it; and I fancy that what I thought were branches from this duct to the teeth, should rather be described as grooves channelled in the horny substance of which the lancet is composed.—*R. H. N. B.*

Skeletons of Animals.—To "T. A. R.," who inquires as to the best method of preparing the skeletons of animals, perhaps the following will be of some little use in the preparation of the smaller kinds; *e.g.*, mice, rats, squirrels, &c. Take the animal in question, and after skinning it and removing the entrails, cut as much of the flesh away as can conveniently be cut off without injuring the bones; next procure a wooden box in proportion to the size of the animal to be placed in it, and having perforated it on every side with holes about the size of a small shot, enclose the specimen. In the vicinity of an ant's nest, scoop a hole in the ground equal each way to about half the size of the box, and place it therein. In the course of a week or so the specimen will, in all probability, be cleaned, the ants feeding upon the flesh; should, however, it happen to the contrary, let it remain longer until cleaned. The larger the family of ants is, the more expeditious and complete will be the work done. The foregoing will also hold good to procure the skeletons of the smaller kinds of birds. —*F. S.*

Large Butterflies.—Of a number of specimens accurately measured by Mr. Wallace (and recorded by him in his "Contributions to the Theory of Natural Selections"), the largest, a male *Ornithoptera priamus*, from Amboyna, gave an expansion of eight inches and three lines. An *O. Helena*, also from Amboyna, measured seven inches six lines, and *O. Poseidon*, from New Guinea, exactly seven inches.

Hummings in the Air.—That purely rural, little-noticed, and indeed local occurrence called by the country people "hummings in the air," is annually to be heard in one or two fields near my dwelling. About the middle of the day, perhaps from twelve o'clock to two, on a few calm sultry days in July, we occasionally hear, when in particular places, the humming of apparently a large swarm of bees. It is generally in some spacious open spot that this murmuring first arrests our attention

as we move onward, the sound becomes fainter, and by degrees no longer audible. That this sound proceeds from a collection of bees or some such insects, high in the air, there can be no doubt, yet the musicians are invisible.—*Knapp*, "*Journal of a Naturalist.*"

ENTOMOLOGY.—Let those who will look scorn upon our pursuit; but few are better adapted to improve the mind. In its minute details it is well calculated to give habits of observation and of accurate perception, while, as a whole, the study of this department of nature, so intimately linked with others above and below it, has no common tendency to lift our thoughts to the great creative Source of Being, to Him who has not designed the minutest part of the minutest object without reference to some use connected with the whole.—"*Episodes of Insect Life.*"

INSECTS ON FERNS (p. 282, vol. viii.).—As I am making observations with regard to the various enemies of cultivated ferns, I should be glad to know what are the insects of which "T. B." complains. Perhaps he will kindly describe their appearance if he is not aware of their designation. Scheele's prussic acid would hardly be a safe application as a remedy in the hands of many fern-cultivators, its highly poisonous properties and its colourlessness leading to serious accidents in some cases. And I should think, speaking from my own knowledge of those engaged in the employment of a chemist, that there are few amongst them who would venture to retail prussic acid for such a purpose, even to those persons known to them. Surely some other destructive agent, less risky, must exist.—*J. R. S. C.*

EELS (p. 282, vol. viii.).—I believe that eels are oviparous, but that the ova are so minute as to escape detection. They spawn in salt-water when they can reach it, but will also do so in fresh water. Your correspondent will, I think, find all that is known on the subject in Couche's "British Fishes," vol. iv. —*R. Egerton.*

SMOOTH NEWT (LISSOTRITON PUNCTATUS).—On reading the notes on the Smooth Newt by Mr. C. Robson, it reminds me of some I placed in an aquarium in May, 1871, and, to my surprise, about a month afterwards, some young newts made their appearance, when I at once removed the old ones to another aquarium, and the young ones, left alone in their glory, got on very well, living through the winter, and appearing more lively as the spring advanced, but did not seem to grow in the proportion I should imagine they should in order to arrive at maturity in a reasonable time, for on June 1st, 1872, the largest scarcely measured an inch in length, and some not more than half an inch. At this time they would be from eleven to twelve months old. I left my situation on the 1st of June, and left my newts in the care of my colleague, from whom I hear they have disappeared without any apparent cause. Would Mr. Robson or any of your readers inform me at what age the Smooth Newt is supposed to arrive at maturity?—*T. B. P., Wrotham, Kent.*

ANTS: ARE THEY PIRATES?—How often has this question been asked, although, I think, Horace sang of the "little ant with much labour," storing up food for the winter; and the moral of the little creature's life is enough to make one pause before rashly destroying it. A very competent authority (the Rev. W. F. Radclyffe) stated in the *Gardener's Chronicle* that "ants are one of the greatest fruit-scourges I have to contend with. I have this spring killed legions with hot water and by hand; yet still they swarm. I am uncommonly obliged to ——— for his recipe. Immediately on reading it I got some sweet oil, and put a little in a saucer in my vinery, where there is a nest under the wainscoting. In a few hours the saucer, sunk in the mould up to the brim, was replete with dead ants. It is a most valuable recipe. The whole horticultural world will feel obliged. I am sorry to destroy them, but they make the first impressions on wall-fruit, and blue-bottles, flies, hornets, bees, and woodlice take advantage of the first impressions." For the information of "Ant-eater," in your last issue, I beg to give the recipe:—Fill small phials two-thirds with water, and add best sweet oil to float on the water to within half an inch of the top. Plunge these upright in the ground, leaving only half an inch standing out, near the nest or runs of the ants. Every ant will come for a sip, and go home to die. No insect can exist with oil in its throat, yet ants are very fond of it. Another sure cure is a few drops of tincture of iodine, or powdered camphor, dropped in the holes; its effect is very suggestive on the part of the ants of "good morning," *quantum sufficit.*—*C. Mace, Reading.*

NONPAREIL.—I shall be much obliged to any one who can give me information about the "Nonpareil" or "South American Robin." I can find nothing about such a bird in the natural histories and books on birds which I have read. Has it been lately brought over from America?—*F. A.*

ANTS AND PRECIOUS STONES.—We give the following paragraph, kindly sent us by a correspondent, for what it may be worth. It is extracted from a Cape of Good Hope newspaper:—"In the narrative of the explorations of the Arizona diamond mines, it is stated that one of the party, an intelligent young Englishman, stepped upon an ant-hill. His attention was called to the appearance of the broken surface, and to his astonishment he found that the whole was a mass of diamonds, rubies, and other precious stones, 'too numerous to particularize.' Can Mr. Trimen, or any other entomologist, inform us whether the habits of collecting precious stones is peculiar to Arizonian ants, or may it possibly be shared by the South African?"

THE BOLDNESS OF THE MUSTELIDÆ.—On December 26th, forty volunteers were prize-shooting at a range surrounded by woods. In the midst of the firing a squeal was heard; and on looking in the direction of the sound, and within fifty yards of us, a rabbit was seen to jump awkwardly as if entangled in a net. Some men ran to it and found a weasel clinging to it; their arrival frightened the vermin, and they secured the rabbit. Within half an hour another rabbit was seen to run across the range, at about seventy or eighty yards' distance, followed by a stoat; they were watched for fully two minutes; the rabbit doubled, so did the stoat, but at length the latter overtook the rabbit and pounced upon it; but some of the men were up nearly as soon, and drove away the stoat and secured the second rabbit. Is it not a remarkable circumstance,—the boldness of these two creatures, weasel and stoat, so near such a body of men and constant firing going on?—*Dr. H. G., Chepstow.*

NATTERJACKS AND SNAKES.—I have for several years past kept a natterjack in a large fern-case.

Several weeks since I got a pair of snakes—young ones about eight inches long—sent to me from England. They were put in the fern-case beside the natterjack, and for a time they all seemed to live happily together. About a fortnight ago, however, the natterjack was seen to swallow one of the snakes. He was first seen with about half of it sticking out of his mouth, and after some considerable difficulty—the snake vigorously protesting—he managed to get it all over. Six days afterwards I found the body of the snake in the fernery, entire, but shrivelled to less than half its former thickness. The natterjack had been fed with raw meat the day previous, so that he could not be impelled to the act by any great hunger.—*John Harvie.*

Forcing Pupæ.—Having in my possession some Sphingidæ pupæ, *elpenor*, *porcellus*, &c., I determined to try my hand at "forcing." Before doing so I obtained the advice of several entomological friends, and well studied the directions given by Dr. Knaggs in his admirable "Guide." Accordingly, I procured a flower-pot saucer, in which I strewed sand, placing over it some moss, in which I carefully deposited the pupæ, covering these over with moss, and over all this a hollow moss-covered framework of cane, "in which the insect might crawl to a place suitable for drying its wings;" then having well damped the whole with tepid water, I placed the contrivance before a good fire, and because the pupæ should not be chilled at night, put the cage into the oven. Of course, the fire had been previously extinguished. This was about three or four days before Christmas. "In from ten days to a fortnight the moths will begin to make their appearance," says Dr. Knaggs. With great anxiety I watched and waited. Ten days, a fortnight, slipped by and not a sign of any emergence. A month, and not a ghost of a moth. Then I began to have my doubts and thought I would just take a peep. The *populi* being of the least value, I took up one; the pliability characteristic of vitality was gone, it was hard and stiff. Gently, I broke it in half, and was rewarded with a shower of thickish fluid in my eyes and mouth. Very much disgusted, with caution I tried other poplars: they were all dead; the pupa-case in each instance filled with the fluid before mentioned, which resembles that ejected by some imagos—especially the Vanessidæ—when recently emerged from the chrysalis. The *ligustri* and elephants were jerking their tails. Carefully damping as before, I waited another week, but in vain. Nothing rewarded my patience. I broke open the privet-hawks: they were all defunct, nothing but hollow shells, even the fluid matter was dried up; but one elephant, when I touched it, moved its tail feebly. With some misgivings I pulled it apart; the upper portion was filled with fluid, but the tail had not yet passed into that state. It is strange there should be no unpleasant odour attendant upon this decay, the dissolving of the fleshy substance into liquid. Sometimes one may learn as much from failure as success; but I am at a loss to understand why my care and patience were not rewarded. Perhaps some kind friends will give me their experience, that ere I try forcing again I may be put right where I did wrong.—*Joseph Anderson, jun.*

Œnanthe crocata.—A short time ago a sad case of death by poison appeared in the papers. I refer to the three little children at Falmouth, two of whom were found lying dead on the beach, and the other in strong convulsions, from which he ultimately recovered. The children were not (as reported in the evidence) poisoned by eating mussels, but by the Water-hemlock (*Œnanthe crocata*), some roots of which were found on the beach near them. The country people call this plant the mock parsnip, from its sweetness. Can any of your readers give me any information respecting the *Œnanthe crocata*, and tell me if there is any antidote to this deadly poison? It is frequently washed up on this coast, and two cases of similarly painful deaths have occurred from it within the memory of an inhabitant of Budock. An Austrian sailor ate of it, and was dead before he could reach his ship; and a little girl was poisoned suddenly. The symptoms resulting from the eating of this root are quite different from those produced by poisonous mussels. —*E. L. Cornish.*

Stings of Wasps.—I must venture a few remarks on the articles relating to the sting of the wasp. The sheath of the sting of a wasp is flat and thin, and so, if put on a slide the wrong way it will appear *sharp-pointed*, instead of which, when placed flat, it ends round, with a slight depression in the middle. The two barbs lie with their backs together; and I am sorry to differ from Mr. Mills; but unless they have been forced out, when not used, they are entirely withdrawn into the sheath. This in all the stings I have prepared I never found otherwise, and I think it seems most natural that a sheath should act as a sheath, when the instrument is not employed. I cannot help thinking that Mr. Malet was somehow deceived in what he saw, especially as he used a single globular lens. The lancets have, I should say, a vessel down them; but I see, with Mr. Mills, *no* aperture o nor about the point of the sting; and if, as he says, the duct passes into the sheath behind the lancet, I don't see how the poison is to get inside them. As to the branches which appear like tubes, I fancy that their use may be to strengthen the barbs. Perhaps Mr. Malet will be able some day to get some of the scarlet-coloured poison out of the bag and view it with plain light. If I can, I will try; at any rate the colour is so marked that there should be no difficulty in seeing it; but with strong sunlight deception is easy. Does Mr. Mills obtain the crystals separate from the bag, or merely see them through it, and can he tell me what description they are?—*E. T. Scott.*

Hybernation of Bats.—While walking recently near Addington (1 p.m.), the sun shining brightly, I saw two bats flying over a small pool, and evidently in pursuit of insects; I watched them for five or ten minutes. Never having seen anything of the kind before, I should like to know whether it is a common occurrence for bats to fly at mid-day at this time of year.—*H. B. E. Fox.*

The Note of the Cushat.—When I was in Wales a year or two ago, I heard the legend about which your correspondents have been writing, from a Welsh squire. This account differs from any which I have seen in your journal, and any one who will listen to the Ringdove's "song," will at once discover that neither "Jemmy" nor "Taffy" is admissible. "Taffy" was going to steal a cow, and in a lone place he heard the words, "Tuk too Coo—Sam," and consequently "Taffy" or Sam, as his name happened to be, was frightened out of his wits, and ran home again as fast as his legs would carry him. The warning "spirit" still repeats from her resting-place the memorable words which struck

such terror into a guilty conscience. Note the slight pause between "Coo" and "Sam," and the interpretation thereof is perfect.—*C. A. Bree, M.D., Colchester.*

Saw-flies.—I quite concur with Mr. James W. Gooch in his remarks upon conclusions drawn upon such common occurrences as even the depositing of insects' eggs, as he illustrates in the case of the Saw-fly; and as allusion has been made to my observations on the "Stings of the Queen-bee and the Worker-bee," in the same number, I venture to add another illustration as an accepted fact—"That in the queen (*Apis mellifica*) the sting, which is covered, is also a modified *ovipositor*, serving to aid her in the deposition of eggs, as well as to attack her enemies"! These scientific naturalists and professors should guide us common out-of-door observers of nature better, and direct us in proper channels of information, and not *classify* errors. Imagine the long curved sting of the queen-bee being used for guiding the eggs along the raised back of a bill-hook, or the blunted edge of a scimitar; but it is not more absurd than what has been shown by Mr. Gooch to be stated regarding the Saw-fly. The excellent illustration in your paper, showing protrusion of ovipositor, will as nearly as possible indicate the queen-bee's ovipositor; and being of the same class (*Hymenoptera*), may perhaps be accepted in its comparative anatomy without having the sliding "back of the sting" to guide the eggs into the cells.—*W. A. Munn.*

Hardihood of Bats.—Having caught a bat in my bedroom, and being anxious to preserve it without injury, I got some spirits of wine, and put it in a glass for about two hours, until I thought it was dead; I afterwards wrapped it up in a handkerchief and put it in a box in a drawer. Being called away from home the next day, and having remained away for three weeks, when I came back I went to the drawer, expecting to find the animal decayed, when, on opening the handkerchief, out flew the bat, as well as when I first caught it. Can any of your readers explain this phenomenon?—*E. K. S. Ascat.*

Grey Flies.—On cutting out the top of a hive last autumn for the purpose of introducing a feeding-bottle, I was surprised, on looking through the aperture, to perceive a number of large flies with black heads and grey bodies crawling lazily about. They did not seem able to fly, and I fancy had been bred within the hive, as I remarked two of those I captured had their wings crumpled up, as if just escaped from the pupa. Their whole appearance was most "uncanny," and reminded me of the sullen-looking Carrion Crow. Can any one tell me what they were, and whether, as I fear, they are destructive to the bees?—*Harry Ridge.*

Remarkable Sense of Smell.—A very extraordinary case has just come under my notice. A certain lady possesses the sense of smell in such a remarkable degree, that it much resembles the power of that faculty in some of the inferior creation, as the dog; for, like the dog, she is enabled by this sense to track, to a certain extent. As an instance of this, on coming from her room one morning, she said that she could smell rabbits. That could not be, it was said, as there were none, and had been none, in the house. But she began to track it! And going straight to an outer door, she opened it, and found the rabbits hung up on a nail. They had been brought home by her brother on the previous evening. Again: she was washing her brother's nightgown; she said it smelt as if a child had been wearing it. It was afterwards discovered that it had been used by a little boy, who had been staying at her house. By this acute sense she is an excellent judge of many things, as, for example, tea. She is enabled to tell, almost immediately, the very best kind of tea. At a tea-merchant's, one day, she was given a few samples, to see which was the best. She put one on one side, went through the rest, came back to the one selected, and pronounced it to be the best. The merchant said she had judged perfectly right.—*W. S. Palmer.*

Arrival of Wax-wings.—It may interest some of your readers to know that we have been visited in this neighbourhood by a considerable number of wax-wings (*Bombycilla garrula*). I have seen a pair that were shot about a fortnight ago, and have heard of one shot since then. Probably others, that I have not heard of, have been victimized.—*G. S. Streatfield, Boston, Lincolnshire.*

Roseleaf-cutter Bee (p. 9).—I have seen several of the leaf-constructed cells of this bee taken out from the upper part of a sunny wall in summer.—*W. H. Warner, Kingston, Abingdon.*

Swans and Fish.—Replying to "F. G. P.'s" query, I may mention that swans do clear water of weed, and that they are very likely to devour the spawn of fish. I met with the fact in Smee's "My Garden." I have not the volume at hand now; but as well as I can recollect, he states that some swans were introduced by him into the river which passes through his garden. The river was well stocked with *Anacharis alsinastrum*, which the swans soon fell upon and devoured with great avidity, clearing the water of nearly the whole supply. Mr. Smee alludes to the fact that the ducks on his premises do considerable harm in the spawning season by feeding upon the ova of the trout. I know not whether he mentions the swans as feeding on the eggs, but if one would devour them, it might be expected that the other would do likewise.—*H. A. Auld.*

Prunella vulgaris (the Self-heal) worthy of Cultivation (see p. 28).—Whether I have read Mr. Holland's year-or-two-back remarks in Science-Gossip about the common Prunella being desirable for garden growth, or whether he mentioned his notion to me when we had a pleasantly-remembered botanical chat together some twelve months ago, or whether I hold it as an original, yet, as it proves (as a coincidence), an identical idea, I know not,—but I know that during my botanical walks in the past year my thoughts have several times set upon the point in question; and happening to come across a show of the plant in fine flower, I have speculated upon the possibility of so improving and tutoring as to render it worthy of cultivation in the garden *parterre*. An impression against this has arisen with me from the—shall I say—very *weedy* appearance the ordinary plant assumes when growing in full vigour and not impeded by competition for possession of the soil—unless, indeed, the earth be of a clayey character and rather baked or pressed hard on the surface. Under this last-named condition one plant certainly becomes more spreading,—dwarf in habit,—and proportionately bears a greater number of largely developed flower-heads. I have noticed, however, upon the Lancashire sand-hills, occasionally, a form

of the plant which I really think ought to be experimented upon: it does not exceed three or five inches in height under the most favourable influences of the driest ground it adorns, it develops spikes of flowers of an unusual size; the individual flower I hold in memory as appearing half as large again as that produced in the ordinary growth of the damp pasture plants, and the colour is a very pretty shade of a somewhat purplish-blue. I had fully intended to try my success with this variety this year, and I shall be much pleased and more satisfied if Mr. Holland will take in charge the necessary stock in due season, that he, too, may try how the plant is affected by change from a maritime to an in-country place of growth. We have also, as a frequent plant in some places I could point out, a regular albino variety of the Prunella,—yellowish-green leaves and stem, slightly tinged calyx, and constant white flowers, but the flowers are small and very fugacious. It does not occur where I mean as a casual specimen or two, but is *the* plant of a considerable space, and although the normal blue-flowered form may, and generally does, occur as its neighbour under precisely similar conditions, the two hold their distinctive characteristics of habit,—the latter bold and masculine-looking, the former delicate and of a gentle feminine appearance. (This I am afraid is rather a far-fetched and venturesome simile.) I think that this albino form should be tested for improvement, and, as with the above, I shall be glad to place it for this purpose under the fostering care of Mr. H. I once met a few odd plants that bore parti-coloured flowers—half the corolla white and half purple, longitudinally, or white and purple in regular transverse bands. These specimens were "sports" from the common plant and had none of the real albino features. There is a *casually white-flowered* form, and there is also a *permanent* (I think) *albino.—Fred. M. Webb*, 3, *St. Domingo Vale, Everton, Liverpool.*

The Compass-plant.—Longfellow, in describing or referring to the compass-plant, has evidently used a poet's licence, or else misapprehended the aspect and character of this coarse plant. Its leaves do *not* point to the north. It is not a delicate plant, nor has it a fragile stalk; with these exceptions, the six lines quoted may be correct. The first public mention of the polarity of this plant was made in communications to the National Institute, by Gen. Alvord, in August, 1842, and January, 1843. Although the fact was known to hunters and settlers before this, abundant observations have since confirmed Gen. Alvord's statements that the *radical* leaves of the plant really present their edges north and south, while their faces are turned east and west. It was at first conjectured that the leaves had taken up so much iron as to become magnetic. This was not sustained by analysis. It was then suggested that the resinous matter of which the plant is full (and from which it is very frequently called the *rosin weed*, in fact is best known by this name among the people of the prairies), might have some agency in producing electrical currents; but from the fact of rosin being a non-conductor of electricity, this was hardly probable. The cause of this polarity or meridional bearing is assigned by Dr. Gray to the fact of both sides of the leaves being essentially alike in the important respect of possessing an equal number of stomata, they seek an equal exposure to the light. The mean of equal exposure in northern latitudes being that in which the edges are presented north and south, the latter to the maximum, the former to the minimum of illumination. On comparing the leaves of *Silphium laciniatum* with those of other species of *Silphium* which show no tendency to assume a north and south position, the number of stomata in the field of microscope at one time × 400 were as follows:—*Silphium laciniatum*, upper surface 20, lower surface 20; *S. perfoliatum*, upper surface 10, lower surface 30; *S. compositum*, upper surface 3, lower surface 9; *S. terebinthinaceum*, upper surface 10, lower surface 20. Its geographical distribution is from Texas on the south to Iowa on the north; from Southern Michigan on the east to west of Missouri and Arkansas; its chief habitat being rich prairie-land. Should any reader of Science-Gossip wish a specimen of the leaves, I will gladly send one to any address, on application.—*Wm. W. Holmes, Warsow, Wyoming Co., N. Y., U. S.*

Showers of Frogs.—Difficult as it may be to explain these satisfactorily, it seems to me that, though infrequent occurrences, the evidence in favour of the fact is too strong to be set aside; and yet one can hardly see why such an incident should be less believable than that of a shower of fishes, they having been found on land, in various instances, in spots to which they could not have migrated. Then we have, as corroborative evidence, an occurrence of a not dissimilar nature last year, when a shower of so-called insects fell at Bath and in its vicinity, and were examined by many persons, scientific and non-scientific. Authorities differ as to the nature of the creatures: they have been represented as annelids, and also as the larvæ of a *Chironomus;* possibly both were mingled. It is not more extraordinary that frogs should be drawn up into a cloud than such animals as these—how, is doubtful. The "waterspout" theory will hardly do; it may "hold water," but nothing else, I suspect.—*J. R. S. C.*

Canine Affection!—"A female dog, belonging to Mr. C——, of Loughborough, became the mother of four puppies. After they were drowned and thrown aside, she sought diligently and discovered one of them, which, though apparently dead, she found means to restore by doubling herself up and warming it, and by now and then shaking it with her teeth. But how transient was her joy, for a relapse took place, and its death quickly followed. She then carried it to a complete grave, which she had previously prepared for it, and buried it with tears in her eyes, and howling as if in the utmost grief."—Old Magazine of the year 1822. Is this story credible?—*J. R. S. C.*

Whitebait.—With regard to the Whitebait question, I beg to thank Mr. Salter for his information (p. 281, last vol.), which is, to my mind, conclusive on the subject.—*E. S. Kemp-Welch.*

Communications Received from—J. E.—W. K.—A. S.—J. H.—S. S.—C. R.—E. H.—D. H. T.—W. S. P.—H. B.—J. T.—M. C. H. D.—G. W. jun.—T. V. C.—W. W. J.—A. W. L.—E. L. C.—R. G.—J. H.—E. T.—E. H. S.—J. N.—J. F. R.—G. G.—H. U. J.—A. S.—A. A.—S. S.—R. H. N. B.—P. S.—J. W. M.—T. B. B.—R. C. M.—J. C. W.—H. B. E. F.—E. T. S.—W. W. B. S.—J. L. C.—J. C. D.—T. W. C.—J. P. A.—F. M. S.—J. C. H.—R. A. P.—H. P. M.—G. E. L.—J. F.—W. H. B.—G. H. S.—J. H.—J. F. D.—W. H. W.—J. A. jun.—H. B. T.—E. De B. M.—E. H.—W. E.—E. D.—H. E. W.—F. S.—R. H.—C. G.—X. Y. Z. A.—H. B.—A. C. H.—J. E. R.—W. D. B.—C. D.—T. C. T. W.—W. N.—A. S.—J. K. J.—I. W.—W. L. K.—A. A.—C. F. D.—J. B.—J. J. P.—E. G. H.—R. E. H.—W. J. H.—&c.

NOTICES TO CORRESPONDENTS.

J. C. D.—The dried plant with seeds is a specimen of *Veronica hederifolia*. The moss is *Dicranum bryoides*.

E. L.—Your suggestion is worth thinking over, but it is a dangerous task to meddle with a usage that works well, and to peril it for an unknown result. It might be tried, however. Many thanks for your kind offers.

YOUNG COLLECTOR.—There is no doubt that difference in the mineral constituents of soils influences the colours of certain plants. Your fern is the Bladder-fern (*Cystopteris fragilis*). The other specimen is the Fir Club-moss (*Lycopodium selago*).

ERRATUM.—In geological column last month, for "Ancient Cheshire forest" read "Ancient *Lancashire* forest."

T. W. COWAN.—Your specimens were as follows:—No. 1. *Bugula neritina*; 2. *Antennularia antennina* (*worn* specimen); 3. *Hydrallmannia falcata*; 4. *Antennularia antennina* (in *perfect* condition); 5. *Halichondria ramosa* (1. *Polyzoa*; 2—4. *Hydroid Zoophytes*; 5. *Sponge*).—*W. S. K.*

MORBID STRUCTURES.—If Medicus will apply to Mr. Wheeler, 48, Tollington Road, Holloway, London, for his list of microscopic objects, he will find that it contains many morbid structures, and he might be supplied with others not mentioned in the list.—A. C. H.

M. D. LOND.—Your specimen is exceedingly difficult to make out. It is not a British plant, and has all the characters, both as regards leaves, inflorescence, and corolla, of a *Lonicera*. It is possibly *canescens*. Your description of its being a "trailer," however, is difficult to apply, unless the word is used loosely. Can you send us a *fresh* specimen, and tell us when it blooms?

R. H.—The egg sent is that of the "Pewit," or "Lapwing," or "Green Plover," as it is severally called (*Vanellus cristatus*).

W. EYRE.—Your specimen is a lichen, commonly called "Cup-moss" (*Cenomyce pixidata*).

MICROSCOPIC SLIDES.—Will Mr. Powell kindly favour us with his address, as it has been mislaid, that we may correspond with him relative to the six slides sent?

C. L. A.—The specimen is *Acacia alata*.

CLERICUS.—You will find a good account of the Palmate Newt (*Lophinus palmatus*) in Cooke's "British Reptiles," published by Hardwicke, 192, Piccadilly, London.

W. ASHTON.—See article on "Collecting and Preserving Lepidoptera," by Dr. Knaggs, in the June number of SCIENCE-GOSSIP for 1872.

MARIAN H.—Any good microscope-dealer will supply you with the slides you require.

J. M. D. ASHBURY.—Could you send us another exuvial skin of the smooth newt? If so, please pack it so as to carry well through the post.

W. GREENSLADE.—1. The use of *italic* letters for specific names in the London Catalogue of British Plants indicates that the plant is believed to have been originally introduced into this country by the agency of man, as distinguished from the agency of natural causes alone. This explanation will be found given more curtly on page 31 of the Catalogue. 2. The use of the *asterisk* (*) bears relation to the *nos.*, not to the *names* of the plants. The first edition of the Catalogue was printed in 1844, and the species were then numbered regularly and consecutively throughout the list. Since that original date, the progress of discovery, and various changes in technical arrangement, have led to the interpolation of several additional names. In such instances the use of the asterisk is resorted to, in order to avoid the inconveniences which would result from re-numbering the entire series of names in each successive edition. "Collecting" pebbles has not yet been published in GOSSIP. There is a book on this subject published by Routledge, price 4s., but we cannot recommend it.

EXCHANGES.

WANTED, Specimens of Voluta, Melania, Chiton, Limax. Different species of Cypræa, and other shells, chiefly West Indian, offered in exchange.—Miss Donagan, Handel House, Haverstock Hill, N.W.

HELIX obvoluta for Dreissena polymorpha, Vitrina pellucida, or Planorbis lineatus.—C. Griffith, St. Swithin Street, Winchester.

SECTIONS of the Shells of Anodon, Pinna, Terebratula, also several Palates of Mollusca, for other well-mounted objects.—Send box, &c., to J. W., 75, Craven Street, Salford.

WANTED, full-grown Larva of the Goat-moth.—Arthur Smyth, Parracombe, near Barnstaple, N. Devon.

LICHENS.—*Lecanora expallens* for other good species. Send lists.—J. Bowman, Cockan, Lamplugh, Cockermouth.

EGGS from unusally fine specimens of *B. Pernyi* and *B. Cynthia*, or local varieties, in exchange for other Lepidoptera.—Apply to Jno. J. Pattman, Winson Green, Birmingham.

FOR Cuticle of Mackerel Aloe send stamped directed envelope and object of Microscopic interest to H. L. Kay, Cathnor Road, New Road, Shepherd's Bush, London, W. A few slides to exchange.

SECTIONS of Seal's Tooth, and other tooth and bone sections, well-mounted, for other well-mounted objects. Diatoms preferred. Send list.—W. Nash, Stroud, Gloucestershire.

CONUS amadis, C. virgo, C. tessellatus, C. figulinus, Cypræa argus, C. Isabella, Helix hæmastoma, in exchange for other foreign shells; those of the genus Conus in preference.—T. C. T. Walrond, 23, Belmont Park, Lee, Kent.

BRITISH LEPIDOPTERA, and dried plants, to exchange for others. Many rarities.—John E. Robson, Sea View, Hartlepool.

ORMER Shell (*Haliotis tuberculata*) for other shells, or British Lepidoptera.—W. H. Booth, 13, Kidbrooke Park Road, Blackheath, S.E.

BARBADOES Polycystina, selected, and mounted in balsam as opaque slides, in exchange for Diatoms, Deep-sea Soundings, Spicules, or other good slides.—George H. Stubington, London Street, Basingstoke.

ELYTRA of Foreign Beetles—Diamond—for microscopic slides. Well-set Lepidoptera for cocoons of Emperor Moth.—Joseph Anderson, Jun., Alresford, Hampshire.

WELL-MOUNTED Slides for injections: opaque preferred. A liberal exchange for good ones.—Harry B. Thomas, 3, Market-place, Boston, Lincolnshire.

SIX Slides for the same number of entomological slides.—Address, Miss E. De B. Meyrick, Downshire Lodge, Blessington, co. Wicklow, Ireland.

GOOD named Slides offered for unmounted microscopic objects. Lists exchanged.—E. Lovett, Holly Mount, Croydon.

DIATOMS.—Himantidium pectinale, Synedra radians, Actinanthidium Thwaitesii, Navicula Smithii, &c., mounted, for other good mounted objects.—John C. Hutcheson, 8, Lansdowne Crescent, Glasgow.

DUPLICATES.—Caja, Quercus, Dispar, S. Populi, Ocellatus, Neustria, Pronuba, Io, Galathea, &c. *Desiderata*.—Tiliæ, Vilica, Carpini, Æsculi, Quercifolia, &c.—R. Garfit, Market Square, Alford, Lincolnshire.

E. FULVAGO to exchange for other Lepidoptera; *desiderata* very numerous.—Jno. Harrison, 7, Victoria Bridge, Barnsley.

HAIR of the Sea Mouse, unmounted, in exchange for any good object.—Apply to H. B. Garston, Torquay.

WANTED, *Mya truncata*, and other British shells, in exchange for Foreign shells.—A. W. Langdon, Hastings.

WANTED, living specimens of *Isoetes lacustris*, also any foreign species of Isoetes, living or dried.—Address, Thomas Bates Blow, Welwyn, Herts.

MOTHS and live Cocoons of the large and beautiful North American silk-moth, *Bombyx Cecropia*, and *B. Cynthia*; also Eggs of a buff variety of *Bombyx Mori* from the Cape of Good Hope, for other insects, bird-skins, eggs, &c.—John Thorpe, Church Street, Middleton, Manchester.

SECTIONS of Kidney of Cat, Lung of Pig, and various slides, in exchange for other well-mounted objects. Lists exchanged.—Address, W. W. Jones, 14, Lancaster Street, Hyde Park.

FOR pieces of skin from the back and belly of the *Harlequin Boa* (West Indian), send stamped and directed envelope to P. Smith, Legh Street, Warrington.

BOOKS RECEIVED.

"The Earth and Man." By Principal J. W. Dawson. London: Hodder & Stoughton.

"Harvesting Ants and Trap-door Spiders." By J. T. Moggridge. London: L. Reeve & Co.

"Handbook of Hardy Trees, Shrubs, and Herbaceous Plants." By W. B. Hemsey. London: Longmans.

"Les Mondes."

"American Naturalist." February.

"Monthly Microscopical Journal." March.

"Grevillea," for March.

"The Earth." No. 8.

"Handy-Book of Rock Names." By G. H. Kinahan. London: Hardwicke.

"The Potato Disease, its Cause and Remedy." By S. Smith, M.R.C.S. London: Smart & Allen.

"The Lens." January, 1873.

"The Canadian Entomologist." No. 1, vol. v.

"Geological Stories." By J. E. Taylor. London: Hardwicke.

RAPHIDES, SPHÆRAPHIDES, AND CRYSTAL PRISMS.

By PROFESSOR GULLIVER, F.R.S.

RESPONDING to the request of the editor of SCIENCE-GOSSIP, I proceed to give some account of these beautiful plant-crystals. And this the more readily because, so far as I know, it would be idle to consult our current floras and other books, including those specially devoted to microscopic objects, for correct definitions of these crystals, and the use of them as characters in systematic botany; since in those works the subject is either wholly neglected or treated so perfunctorily as still to require distinct reiteration. As space is necessarily limited, the matter must now be confined chiefly to such points as may invite and assist the student. More ample details, especially as regards my extensive and original observations on the value of raphides as characters in systematic botany, are given in my papers, epitomized in the *Popular Science Review* up to October, 1865, since continued in the *Annals of Natural History* for November of that year, and in many numbers of *Seemann's Journal of Botany*, and of the *Quarterly Journal of Microscopical Science.*

On the present occasion, the matter concerning the crystals may be treated in the following order:—1. Nomenclature; 2. Taxonomy; 3. How to find the crystals; 4. Their Microscopic Interest; and, 5. Their Composition and Use. And as we often meet with private inquiries and public advertisements for "good microscopic materials," so it will now be shown that, even in this limited department, Nature has scattered those very materials broadcast everywhere around us, whether in towns at Covent Garden, and druggists' shops, or in country fields, ditches, and lanes. In the following woodcuts, which are all copies of original drawings by me from nature, nothing is depicted that may not be seen under an object-glass of half or quarter-inch focus, and often of much less power. Of each figure the objects are magnified somewhat to the same degree, except when otherwise noted; and as their sizes are given in the text, specifications of the enlargement are not necessary for perspicuity. The student should examine some of the crystals for himself, as he may easily do in the plants now mentioned as always obtainable for this purpose. In the text, for the sake of precision and the want of English equivalents, some hard words are used; but all these are explained in most of our popular floras or manuals.

1. *Nomenclature.*—All microscopic plant-crystals were formerly called raphides, and this error, though fatal to their taxonomic value, is common now; for it is still perpetually confounding forms essentially different, and occurring, if understood in this loose and incorrect manner, almost indiscriminately or generally in numberless plants that never produce raphides at all.

Raphides, fig. 57.—These are the well-known needle-shaped crystals occurring about a score in a bundle, either plainly in a soft cell, as, *e. g.*, in the berry of *Arum maculatum* (fig. 57, *c*), or in intercellular spaces, without an evident special cell, as in old fronds of *Lemna trisulca* (fig. 57, *f*), or devoid of any distinct cell or intercellular space, as in the ripe berry of *Tamus* (fig. 57, *e*). However this may be, the raphides, before they have been disturbed, always lie loosely in contact, side by side, like needles in a packet; and so no wonder that they have been named from a Greek word signifying a needle. The shaft of each of the raphides is commonly smooth and rounded, so that they move easily on and over each other; and it tapers gradually to a point at each end. Raphides have an average length of about $\frac{1}{124}$th of

an inch, and a thickness of $\frac{1}{5000}$th. But they vary much in size in different plants, being very large in the officinal Squill (*Urgenia*), very small in the Bedstraws (Galiaceæ), and of intermediate size in the Black Bryony (*Tamus communis*). I have never been able to find raphides in any British tree, though they are plentiful in many foreign trees, as, *e. g.*, the Screwpines and Vines.

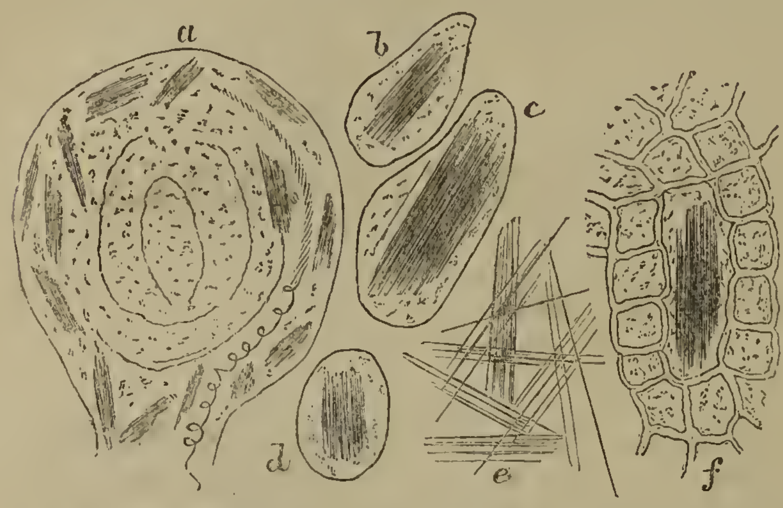

Fig. 57. Raphides: *a*, in the ovule of Fuchsia; *b*, in a cell from the berry of Fuchsia; *c*, from the berry of *Arum maculatum*; *d*, from the leaf of *Neottia spiralis*; *e*, loose from the berry of *Tamus communis*; *f*, in an intercellular space of an old frond of *Lemna trisulca*. All moderately magnified.

Biforines, fig. 58.—Sometimes the cell in which the raphides are contained is soft and viscid, like a bit of protoplasm, devoid of a distinct cell-wall, though the wall, like Mohl's primordial utricle, may be made apparent by chemical means. From such a cell, as may be often seen in some Araceæ during the microscopic examination, the raphides escape at one or both ends (fig. 58); and hence the term 'biforines' by the French botanists. The phenomenon is singularly beautiful, for the brilliant and hyaline crystals emerge from the cell with a life-like activity that is quite surprising.

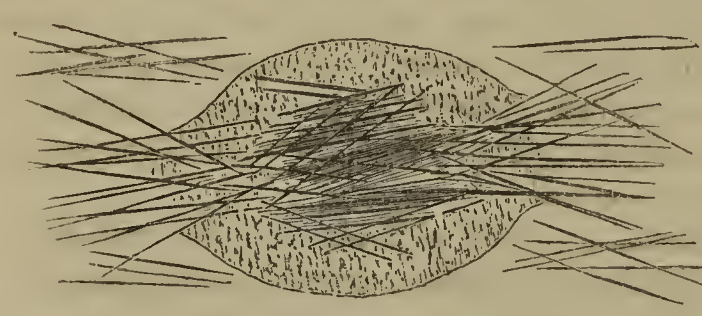

Fig. 58. Biforines from *Richardia æthiopica*.

Crystal Prisms (figs. 59 and 61) are also acicular forms, occurring either singly, or two or three partly consolidated, never, like raphides, loosely in bundles; and each prism has several flat faces, and as many angles; the tips of the crystal appearing sometimes truncate, more often pyramidal, with the base of the pyramid corresponding to the shaft; and the end may be pointed, or like a carpenter's chisel, or wedge-shaped, or sloped off obliquely from angle to angle, or from face to face of the shaft. Of the quadrangular prisms the faces may be all equal, or two of them broader than the other two; and of the three-sided prisms a transverse section of the shaft may present either an isosceles or equilateral triangle. Occasionally the shafts are shaped as if from a longitudinal cleavage, either partially or completely, through the faces or angles of the crystals. They are firmly imbedded in and along the plant-tissue, and seldom or never in a cell that is easily demonstrable. They are mostly larger, sometimes smaller, than raphides; and in *Quillaja saponaria* about $\frac{1}{160}$th of an inch in length, and $\frac{1}{1600}$th in thickness. In the Shallot (*Allium ascolonicum*) and some other Onions (fig. 61, *r*), the prisms are shorter and thicker, often apparently truncate, though sometimes plainly seen with a low pyramidal tip, having four sides; the shafts either forming crosses consolidated at the intersecting parts, or occurring singly, varying much in size, and lying across the tissue-cells. In the ovary and seed-coat of Cynareæ the prisms (fig. 59, *h* and *i*, fig. 61, *p*) are much smaller, and frequently, as also in several different orders, fused together longitudinally.

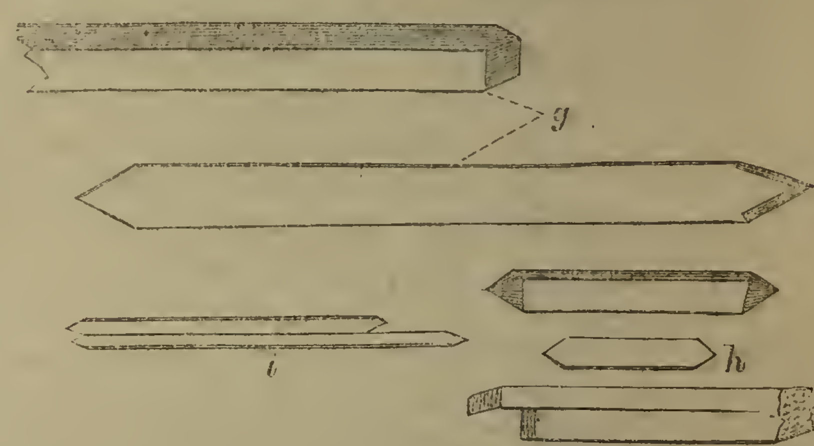

Fig. 59. Crystal Prisms, highly magnified: *g*, from *Quillaja saponaria*; *h*, from the testa of *Silybum marianum*; *i*, from the ovary-coat of *Carduus lanceolatus*.

Sphæraphides, fig. 60.—Each of these is usually a rounded conglomeration of minute crystalline granules or angular crystals, frequently smoothish, often granular or stellate on the surface, from projecting granules or points of the constituent crystals, and generally contained in a distinct cell (fig. 60). A very common diameter of the sphæraphides is about $\frac{1}{1000}$th of an inch each; often smaller, especially in several British plants; much larger in others, and larger still in some foreign species, such as the Cactus-tribe. When the sphæraphides are regularly spangled in a membraniform part, consisting mainly of their cells, I call it Sphæraphid Tissue (fig. 60, *n*); and of this beautiful examples may be seen in the leaves and inner layers of the bark of *Aralia spinosa*, common on our lawns, in the sepals of the Purple Loosestrife of our ditch-banks, and some wild Geraniums, and in the leaves—with a profusion of raphides—of *Veratrum nigrum*. Sometimes each of the sphæraphides appears as if suspended within its cell by a pedicle (fig. 60, *k*), which is not always easily seen: these, which Mr. Roper has described

in Science-Gossip of March, 1873, and which the French botanists called 'Crystal glands' and 'Cystoliths,' occur in several Moraceæ and Urticaceæ. Raphides are found occasionally in the same plant, together with either crystal prisms or sphæraphides, or both, as may be seen, *e. g.*, in some Pontederaceæ, Vitaceæ, Mesembryaceæ, and Melanthaceæ.

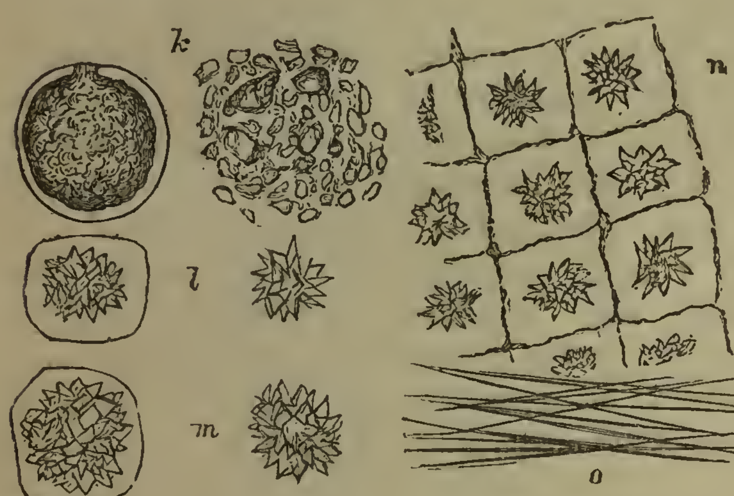

Fig. 60. *k*, Sphæraphides, one in its cell, the other crushed, from the leaf of the Nettle; *l*, Sphæraphides, one in its cell, the other naked, from the stem of *Mercurialis annua*; *m*, the same, from the leaf of *Silene maritima*; *n*, Sphæraphid tissue (magnified less than half as much as the other objects), from the leaf of *Veratrum*; *o*, Raphides, from the same leaf.

2. *Taxonomic Characters.*—As it would require a volume to do justice to this part, it can be touched but slightly here. Seeing the difficulty and fugacity of many established botanical characters, and the consequent perplexities of the student, it seems strange that systematists should not be ready to help him, by the use of any little contribution, from whatever quarter, and however novel and unexpected. But they have hitherto totally ignored the characters afforded by raphides, although these are eminently natural and constant, and often more plain and permanent, fundamental and universal, than some of the stereotyped diagnoses. In our flora, raphides are so characteristic of the dicotyledonous orders Onagraceæ, Balsaminaceæ, and Galiaceæ, that you might truly, and most briefly and sharply, define Onagraceæ as Calycifloral Exogens abounding in raphides; and so in like manner the other two orders. Some endogenous orders might be similarly characterized, while, on the other hand, there are orders—Hydrocharids, *e. g.*—regularly ex-raphidian amid their allied orders which as constantly abound in raphides. The Grape Vine and all its nearest allies of the order Vitaceæ, of which the Virginian Creeper is a familiar example, teem with raphides; and this character, frequently associated with sphæraphides, is sufficient to distinguish the Vines from the other orders of the Berberal Alliance. Even that most curious plant *Pterisanthes* proclaims by its raphides its affinity with the Vines, and so does *Leea*, though it has been removed from them by some eminent systematists, and even erected into a distinct order by Von Martius. Among our common thick-leaved window-plants, the Mesembryanthemums abound in raphides, sometimes with minute prisms, and other crystalline forms, in the same plant; and though this large genus is thus characterized, other members, such as *Glinus*, of the same order, are devoid of raphides, and hence show less relation to Mesembryaceæ than systematists have believed. Raphides are plentiful in the Hyacinths. The Cactaceæ afford large sphæraphides and often a profusion of coarse crystalline grit. The Jalap of our Pharmacopœia, being a *Convolvulus*, is quite devoid of raphides; and thus easily might it have been distinguished from *Mirabilis jalapa*, of the order Nyctaginaceæ, in which they abound, and which was so long and erroneously supposed to afford that drug. Though many Monocotyledones are raphis-bearing, several orders of them—the Grasses and Sedges for example—are devoid of raphides. Sphæraphides occur abundantly, and often very characteristically, in the New Zealand Spinach of our gardens, and in our native Goosefoot plants, in the Nettle or Hop tribe (fig. 60, *k*), annual Dog's Mercury (fig. 60, *l*), many members of the Silenal Alliance (fig. 60, *m*), the Wayfaring-tree, Water-Milfoils, and in numerous different orders besides. The well-known crystals in the Rhubarb of the Pharmacopœia are sphæraphides. Crystal prisms are plentifully produced by many Monocotyledons, as may be seen in the common cottage-garden favourite, *Iris germanica*, in the officinal sweet-scented Orris, in the bulb-scales of the Onions (fig. 61, *r*), and, among Dicotyledons, in the Guaiacum bark and Quillaja (fig. 59, *g*) of the shops. Either in the ovary or testa of our native Cynareæ and other Compositæ, as may be seen (figs. 59, *h* and *i*, and 61, *p* and *q*) in *Serratula*, *Centaurea*, *Carduus*, *Silybum*, and the Inuleæ, crystal prisms are frequent, like to, but smaller than, those of the foreign Quillaja; and in some afford good specific characters. For example, the little long prisms of *Centaurea nigra* (fig. 61, *p*) and *C. cyanus* at once distinguish these species from *C. scabiosa*, as in this last there are only those minute and short crystals, cuboid, prismatic, flat, or lozenge-shaped (fig. 61, *q*), often each within a cell, which are so very common in various orders of plants, especially Amentiferæ. The curious crossed and seemingly truncate prisms of certain species of the Onions (fig. 61, *r*) are very characteristic.

3. *How to find the Crystals.*—Of any plant already cited as affording them, scrape and mash to a pulp a bit of the leaf or other part in a drop of water on the object-slide, then press with a thin glass cover, and the crystals will be easily distinguishable under an objective of half or quarter-inch focus. Very delicate sections of the plant-tissue may be needful to show the crystals uninjured in their natural situation. Pulpy parts, like the berries of the Arums and Black Bryony, and thin transparent

parts, such as bulb-scales of the Shallot and fronds of *Lemna trisulca*, may be examined very easily without any such preparation.

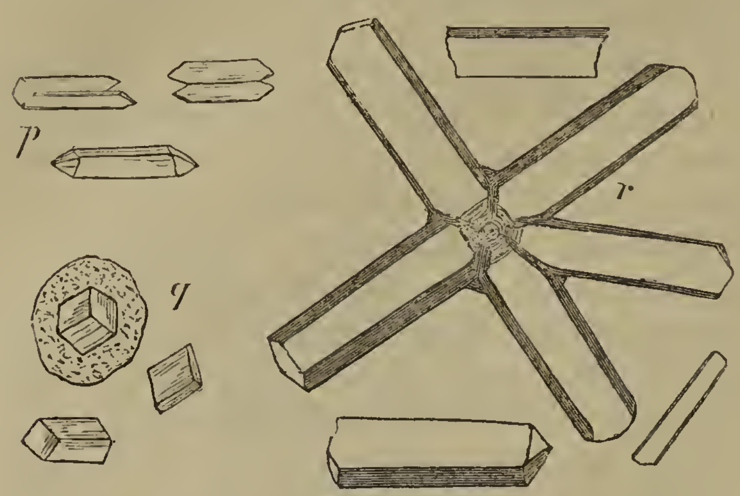

Fig. 61. *p*, Crystal Prism from ovary-coat of *Centaurea nigra*; *q*, different forms, one in its cell, from the same part of *Centaurea scabiosa*; *r*, Crystalline Cross, and three single crystals, from bulb-scale of Shallot. All highly magnified.

4. *Microscopic Interest of the Crystals.*—Of all the objects in the plant-tissues, there are none more beautiful and more likely to interest the tyro in micrographic botany than these crystals. While under examination the glassy raphides roll about in various directions, like a loose bundle of sewing-needles thrown on a table. The sphæraphides are commonly contained in distinct cells, and the crystal prisms are scattered and fixed in the direction of the fibres of the plant, but sometimes, as in the Shallot, lie across the tissue-cells. The prisms are well adapted for experiments on the polarization of light, as Colonel Horsley has often shown at the Canterbury meetings of the East Kent Natural History Society. Any of the crystals may be easily preserved, either simply dried, or in balsam or dammar, or in glycerine and other wet mediums. And when numerous slides have been collected and correctly labelled, their taxonomic interest will become evident, and thenceforth go on increasing with the increase of the collection, which may become an important one for reference as to the value of the crystals as characters in systematic botany. Thus this might well be an elegant and useful occupation, in which ladies could engage, for pleasing and instructive "half-hours with the microscope"; and which in this single subject would afford an extensive and valuable cabinet of beautiful microscopic objects, and rational researches that are not likely to be exhausted after many half-years have been thus employed. The inquiry might be extended to the development of the raphides, from the ovule and seed-leaves, to the different parts of the mature and growing plants, to their decline, death, and rottenness. For experiments of this kind the common Onagraceæ of our gardens, fields, and lanes, and the different species of *Ornithogalum*, would answer; and they might be grown for the purpose in little pots of various soils, and thus give perpetual pleasure and profit to any one with the mind and means to use the microscope thus rationally.

5. *Nature and Use of the Crystals.*—The crystals are by no means, as maintained by eminent observers, diseased or irregular products in plants, like calculi in animals, but are so truly part and parcel of the essential nature of the plant in which they occur, that it cannot be well grown without producing them, and this from the birth to the grave of the species. Numberless examples of this truth may be found in the plants of our common pools and fields; and I have often proved it experimentally in various members of the dicotyledonous orders Balsaminaceæ, Galiaceæ, and Onagraceæ, and in some Monocotyledons. The crystals are mostly oxalate of lime, with a small proportion of other earthy salts. Though this, according to Professor Douglas Maclagan, is the case with raphides, some of them appear to be phosphate of lime, according to examinations made, at my request, by the late John Davy, of these crystals in *Epilobium*, *Galium*, and *Smilax* (*Ann. Nat. Hist.*, June, 1864). And this leads us to a notice of the use of such crystals. The Sarza of the Pharmacopœia is a *Smilax* very rich in raphides and starch; and hence, probably, the well-known efficacy of this drug in those diseases, especially of the bones, in which there is a deficiency of the earthy phosphate. In like manner the Duckweeds abound in raphides and starch, and on these plants young mammalia, water-birds, and lower animals feed greedily; and no doubt this is the very pabulum best adapted for the nourishment and growth of the bones and other parts. Many animals are ever feeding on seeds in which microscopic crystals abound. Thus we come to understand some of the manifold ways in which Nature has provided for the wants of her creatures. We have seen that science too can turn these crystals to good taxonomic purpose; and it may be added that they are often the best tests of the genuineness of many vegetable drugs; such as Orris, Quillaja, Guaiacum, and Rhubarb. The false or American Sarza, being an *Aralia*, is at once plainly distinguishable by its sphæraphides from the genuine Sarza. Again, as manure, the calcareous salts which compose the crystals must be of great value; nature storing a superabundance of them in the living plant, to be restored in the dead leaves and other parts to fertilize the earth. Accordingly, we see good reason why the gardener so carefully husbands his leaf-mould; and that such plants as the Duckweeds, Fuchsias, and Willowherbs, should, from their profusion of raphides, in this respect best serve his purpose. In fine, as poor Charlotte Smith, who loved our wild flowers so well and truly, sung of them:—

"All are for use, for health, for pleasure given,
All speak in various ways the bounteous hand of heaven."

Canterbury, March 6, 1873.

NOTES ON COLLECTING AND PRESERVING LAND AND FRESH-WATER SHELLS.

THERE are two or three little difficulties by which young collectors are often beset, which are not referred to in Mr. Tate's able paper on the above subject.

It occasionally happens, for instance, after the boiling process has been completed, that from some cause or other (such as an old injury to the shell) the animal, instead of coming out of the shell entire, breaks in two, and the hinder portion is drawn back, and is quite out of sight by the contraction of the part which adheres to the shell. I find the following to be the best plan for getting the remainder of the animal out of a large shell. Take a piece of wire (the kind used for tying soda-water corks answers very well); bend the end into as small a hook as possible, and then coil the wire into a sort of spiral spring of such a size that it can be easily *screwed*, so to speak, into the shell. Introduce the coil as far as possible; by the backward pressure the connection between the animal and the shell is generally broken. Then withdraw the wire, and it will seldom be necessary to make more than two or three attempts before the little hook catches the remains of the animal and brings them out entire. This mode is not of course available for small and thin shells, but in these the animal generally breaks through the weakness of the tissues, and not from a portion adhering to the shell. To leave the "tail" of the animal, however, in such shells as the transparent species of *Zonites* greatly disfigures the specimens; but breakage may generally be prevented by drawing the animal out, not in the direction of a tangent to the shell, but round the under side of the outer whorl. By this means the tissues on one side are not stretched more than those on the other. To extract the animals of small species, I use a fine-pointed needle fixed in a handle, which I hold like a pencil.

In order to keep the shells of small bivalves closed until dry, I find cotton roving more convenient than thread, as the turns of the roving adhere to one another sufficiently to keep the valves shut without tying.

Lastly, weathered specimens of land shells are greatly improved by rubbing them over slightly with olive-oil; after standing a short time every particle of unabsorbed oil should be carefully wiped off. Some shells have a polished epidermis which is liable to crack and flake off when it becomes very dry: a similar application of oil will generally prevent this.

G. H. H.

"THE utility of the study of natural history will be recognized by any one possessing even rudimentary ideas of the science."—*Milne-Edwards*.

NEW BOOKS.

THE inexorable limits of space forbid us devoting more than a few lines to noticing such works of a general scientific character as we think may interest and instruct our readers. Never before was the scientific press so active as it is at present, nor do we remember that, on the whole, the work was ever more thoroughly or effectively done. The book to which we draw attention first is a bulky volume, with a "Government" look about it. That soulless body is not obliged to "get up" a work with any view to an attractive appearance, for it is above and beyond all competitors! Thus far, therefore, we would recommend our Government publishers to copy the example of the United States Government, who send forth their works in a manner creditable even to the leaders of the trade. And yet we know of few works more thoroughly useful, or in which there is condensed such a variety of genuine observation and hard work, as the volumes of our own Geological Survey. They literally bristle with facts. Their authors are not allowed that literary liberty which they might assume if "Government" did not interfere. But to those people interested in the almost mathematical correctness with which various strata are mapped and measured, with their commoner fossils described, the "Memoirs of the Geological Survey" recommend themselves. The last volume issued is on "The Geology of the London Basin," by William Whitaker, B.A., F.G.S.; and this, in our opinion, is by far the most conscientiously and effectively compiled of any. Mr. Whitaker's name is well known as that of a most able geologist, and this work of his cannot fail to enhance his reputation. In it he has been assisted by Messrs. Hughes, Woodward, Topley, and others. This volume, however, is marked "Part I. The Chalk and Eocene Beds of the Southern and Western Tracts." It therefore includes some of the most interesting stratigraphical phenomena of the later Secondary and earlier Tertiary deposits of this country. The well-sections on the southern and western sides of London are minutely given, a fact that we place on record, on account of its economical value to well-sinkers and others. The metropolitan and suburban districts are specially particularized, and a section is given of the hypothetical ridge of old palæozoic rocks underlying London. A very interesting portion of the volume is that devoted to geological disturbances and denudation, and the effects of these upon the physical scenery of the district described. A most compendious bibliography, including all the papers and memoirs that have been printed on the geology of the London basin, is given at the end of the work. Altogether, we sincerely congratulate Mr. Whitaker and his colleagues on the successful manner in which

they have completed an arduous and often thankless task.

The little but well got-up "Handy-book of Rock Names," just published by Mr. Hardwicke, Piccadilly, is by another Survey man, one who is well known as an able writer and extensive observer, Mr. G. H. Kinahan. Lithology has never had the attention paid to it in this country it has received in Germany, and the book before us supplies a want long and extensively felt by students. We do not know any British geologist better fitted for the task than Mr. Kinahan, who has done his work as if he knew the importance attached to it. Students and advanced geologists alike cannot fail to derive great advantage from the succinct manner with which the author has arranged his matter. There is a classified table of rocks, after which we have them divided into two groups, called, respectively, *Ingenite* (or igneous) and *Derivate* (or stratified), Dana's termination of *yte* having been adhered to, instead of the less correct but more common *ite*. Everything the student requires to know concerning rocks, their distribution, stratigraphical position, mineralogical character, &c., may be readily found, and thus much time be saved. We cordially recommend this cheap and convenient little work to every student, and to science-teachers especially, than whom no class of men require more available knowledge.

We wish we could speak words of equally undiluted praise of the next book on our list,—"The Story of the Earth and Man," by Principal Dawson (London: Hodder & Stoughton). It is attractively got up, and well written. The author is a well-known geologist, whose field-work is largely appreciated and widely known. Had it not been for his bitter and often frantic hatred of anything approaching "Darwinism," or the "Doctrine of Evolution," we should have had nothing but a favourable notice to give. And this we say, not because we are wedded to these theories, but that we hold the true spirit of science to be *investigation*, not *vituperation*. It would be impossible for any young student to be otherwise than ignorantly prejudiced against some of the grandest speculations of our time, after reading this volume; and we more than surmise that the author would feel gratified by such a result. But, if either "Darwinism" or "Evolution" be true or false, let them be proved so on scientific grounds, not by wordy declamation or unconscionable praise. Surely Prof. Dawson had temporarily forgotten his usual scientific calmness when he wrote of what is acknowledged to be the greatest philosophical system of our day as follows:—"This Evolutionist doctrine is itself one of the strangest phenomena of humanity . . . a system destitute of any shadow of proof, and supported merely by vague analogies and figures of speech. . . . It might be taken as an indication that the human mind has fallen into a state of senility, and, in its dotage, mistakes for science the imaginations which were the dreams of its youth." And in previously referring to the philosophy, he alludes to it (p. 249) as "the advent of those poisoned streams and mephitic vapours which threaten intellectual obscuration." The book bristles with absurd and unscientific declamations of this kind. But when the author accuses the systems of Darwin and Spencer as having retarded the progress of natural science, he states what is extremely incorrect; for all will concede that there has been given to every department of natural science, since the appearance of "The Origin of Species," an impetus which has extended its conquests in a marvellous degree. We are sorry, for the sake of Professor Dawson's reputation, that he has disfigured a capital book by uncalled-for abuse and rash assertions, and we conclude our notice by recommending him carefully to study (what the perusal of his book has convinced us he has not yet attempted) Herbert Spencer's "Principles of Biology."

Our next notice is of a little volume, also on geology, carried out in a philosophical spirit quite the reverse of that we have been compelled so far to condemn. It is a new edition of the "School Manual of Geology," by the late Professor Jukes (Edinburgh: A. & C. Black), and now edited by his nephew, quite a young man, Mr. A. J. Jukes-Browne. Many will remember it when it quitted the hands of the late Professor, and we cannot bestow higher praise on this edition than by stating it has been brought down to the present time, and includes the most recent discoveries, not only without interfering with its original good character, but improving upon it. What Mr. Jukes-Browne has added is well done, and strictly in the spirit and temper of the lamented author.

A charming little volume or "Monograph," as it deserves to be called, is that entitled "Harvesting Ants and Trap-door Spiders," by J. T. Moggridge (London: L. Reeve & Co.). It is illustrated by full-page chromoliths that are beautifully drawn and coloured, and is got up in altogether a very attractive style. Mr. Moggridge here delineates the habits, characters, &c. of an extremely interesting class of animals, and traces the instincts of these remarkable groups. The reader will find many long-continued assertions relative to the storing habits of ants, &c., here disposed of for ever; so that lazy people need no longer be troubled by having the ant perpetually set before them as a model of industry. We welcome this book as a conscientious contribution to the natural history of two almost unknown groups of animals, well written, and whose facts have been carefully and even laboriously described. The author amply deserves the credit which his little volume has already obtained.

"The History of Polperro" (Simpkins & Mar-

shall, London) has been published some time, but we have not been able to notice it. It was written by that well-known Cornish naturalist Mr. Jonathan Couch, and this edition contains an account of the life and labours of the author, by his son, Mr. Thomas Q. Couch. The legends and folk-lore of that out-of-the-way corner of England have an attraction for archæologists possessed by no other corner of this country. Mr. Thomas Couch has here presented us with an admirable and brief biography of a man whom we had long thus wished to know. The list of Cornish plants appended is valuable, having been noticed by the late Mr. Couch. The editor has made many additions to the popular antiquities, and altogether has produced a very readable and useful little volume.

"The Ocean World," by Louis Figuier, just published by Cassell & Co., is a wonderful improvement on the first and larger edition, with all its inaccuracies, for it is edited (we may say *re-written*) by Dr. Percival Wright. It always seemed to us a pity that such beautiful and copious illustrations should have been got up to float off an incorrect and incomplete, although attractively written, account of the animated wonders of the great deep. Now that objection has been removed, and Dr. P. Wright's edition of the "Ocean World" has the merit of being scientifically correct and equally attractive. The present volume is one admirably adapted for a gift-book.

"Ozone and Antozone; their History and Nature," by Dr. Cornelius B. Fox (London: J. & A. Churchill), is a book dealing with a subject outside our own line of research, and yet nearly approaching it in many respects. It appears to treat ably on the entire question, historical and chemical, and applies the result to the practical life of our large towns and cities. Those interested in this important question, therefore, will find in this handsomely got-up volume all the information they need. Whether they accept the theories of the author or not, they cannot fail to admire his industry.

Neither inclination, modesty, nor space allows us to do more than remark that the "Geological Stories," many of which originally appeared in this journal, are now re-published in a volume, with considerable additions, and the pictorial aid of 200 illustrations, by Hardwicke, 192, Piccadilly.

RECORDS OF RARE PLANTS.

AS I had seen no answer to my plan in SCIENCE-GOSSIP some time back, proposing the formation of a Botanical Record Club, I thought that the proposal had not found much favour in the eyes of the botanical readers of SCIENCE-GOSSIP.

I am glad to see such a good botanist as Mr. F. Arnold Lees think that my plan might be carried out, though objections and obstacles stand in the way; but none, I think, are insurmountable. So with your leave, Mr. Editor, I will give a few more particulars. The use of such a society is obvious. We are now troubled in our manuals, guide-books, &c., with localities of plants, which are erroneous, but which have been copied from book to book, and when we search they cannot be found, thereby causing much disappointment and trouble; and the evil is, that they are not remedied, and others are continually falling into the same error. Also that the localities where the plants ought to be found, are not known to many. In these days of drainage of bogs and marshes, and the ploughing up of waste land and commons, the habitats are continually changing, and required to be observed anew and re-recorded. I do not agree with Mr. Grindon in his Manual, as I think there is plenty of ground which might be used without eradicating our rarest plants. The spots where they grow seem always to be taken first. In this county (Herts) the only small bogs that it possessed (only a few acres) are now drained, and almost all our bog-plants, such as *Drosera*, *Anagallis*, and some rare Carices, are gone; but still the Flora contains the localities uncontradicted, and it still gives a deal of trouble to any one searching after them, as I did myself. It is to remedy these evils that the club would be eminently useful.

It is a well-known fact that most (I may say all) counties in England possess some few botanists, and I think that in each of them two or three could be found to make members of the club;—practical botanists, I mean, not mere collectors, whose reports would be trustworthy and reliable.

Such botanists would not object to send a specimen of each plant reported on their list to be identified by some one appointed for that purpose. The plan to form the club would be:—

1st. To get as many botanists (some in each county if practicable) as possible to become members; and no doubt there will be plenty when the object of it is known.

2nd. To choose one of the best botanists from among the members, one who has plenty of leisure time, to act as identifier of the plants sent, and another as recorder of localities.

3rd. That every member should send, if possible, a single specimen of each plant that he reports, with the exact locality and latest date the plant was observed, and whether it has been known to grow there for any considerable length of time.

In case of very rare plants, where there are but few specimens, it is a question whether the exact locality should be published, for fear of extermination.

4th. That a report of the year's work should be printed at the end of the year. A small subscrip-

tion from each of the members would suffice to defray printing expenses, supposing the book did not find a ready sale, which I think it would.

For my own part I would do my best to aid by searching the Herts localities, as Mr. Lees proposes to do of Durham. The one objection, I may add, is that making known the localities would endanger some of the plants, but I think the benefits will outweigh the disadvantages. I might say a few words on some of the rare plants of Herts. *Crocus vernus* still grows at Mimms and Totteridge. *Fritillaria meleagris* also at Barnet and Totteridge. *Ajuga chamæpitys* in its old locality, at Pegsdon, near Hitchin, with *Iberis amara*. *Bunium bulbocastanum*, though less plentiful, is still abundant in one or two localities near Hitchin. I am afraid that the very rare *Orobanche cærulea* is extinct in Herts, as the place it occupied is ploughed up; also *Lycopodium clavatum*, which grew on Tring Heath, is gone, the heath being partially enclosed. Though most of the botanists who compiled the records of old localities are dead or aged, as Mr. Lees remarks, I think we should find aid from such as are able to give it. In conclusion I may add the motto of the Herts Flora: "Turpe est in patria vivere et patriam ignorare." (Linnæus, "Fauna Suecica.")—*Thomas Bates Blow, Welwyn, Herts.*

SACCHARO-POLARISCOPE.

If "F. M. S." possesses a microscope, he can with very little expense turn it into a polariscope substituting a gutta-percha tube about a foot in length, and of sufficient diameter to receive one of

Fig. 62. Needle to denote arc of polarization.

the eye-pieces, and allow it to revolve freely, for the body of the instrument: the base of the tube must be closed by a disc of the same material, in which a central aperture has been made, and over which a disc of glass has been cemented. Prepare a wooden disc about three inches in diameter, with a central aperture of the diameter of the exterior of the tube, over which it should be fitted flush with the edge of the tube: upon this disc should be pasted a card, upon which a circle divided into degrees has been drawn. A needle must be fixed on the the eye-piece, in order to denote the arc of polarization: this can be readily made of a piece of thin brass or even tin. The above diagram will at once explain how it can be done. In the aperture is placed the lower portion of the eye-piece; the collar A is pushed up to the milled edge of the eye-piece (the indicator should fit tightly upon it to prevent any shifting when the eye-piece is revolved): over the eye-piece place a cap containing a Nichol prism.

Beneath the tube attach the polarizer in the usual way, or a bundle of glass plates may be substituted for the mirror. The tube should be filled to about three-fourths of its length, and when properly centred is fit for use; but for accurate research a thermometer and hydrometer are essential.

The following diagram represents a section of another form of polariscope, and will be found efficient and inexpensive, as most of it can be constructed of wood. A is an upright attached to a

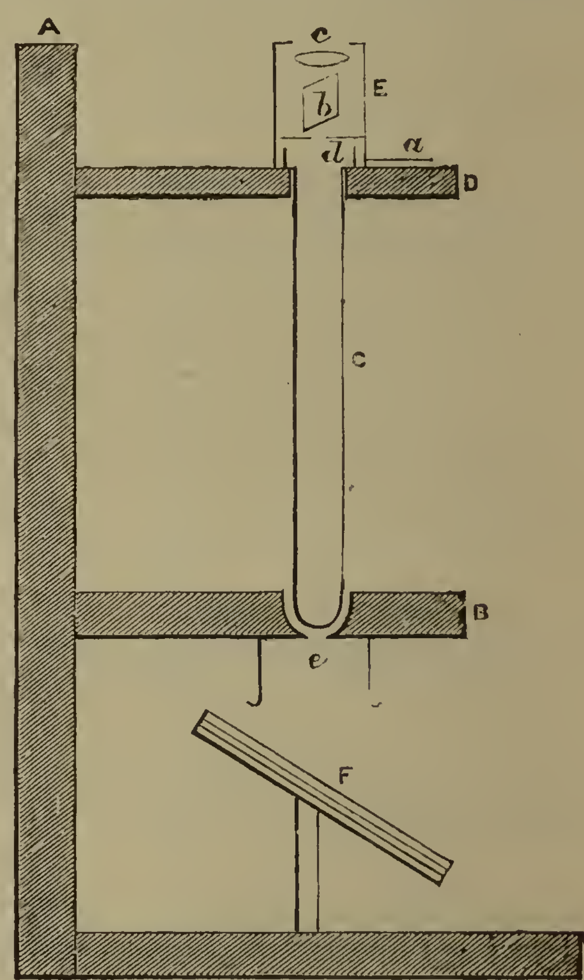

Fig. 63. Cheap form of Polariscope.

firm base; B, fixed stage, with a cup-shaped aperture in the centre for the reception of the tube C. D, an adjusting-arm (made to slide up and down, in order to receive tubes of various lengths) supporting the tube C, and on which is fitted the analyzer E, revolving on a flange attached to the arm D. E, analyzer, to which is fixed the index *a*; *b*, a double-image or Nichol's prism; *c*, eye-lens; *d*, diaphragm; *e*, a short tube attached to B, for the purpose of carrying a Nichol's prism for polarizing, instead of the bundle of glass plates E, for which an ordinary silvered reflector must be substituted. The graduated circle may be attached to the arm D.

Before placing the tube containing the liquid in position, the zero must be fixed: if a doubly refracting prism is employed as analyzer, this will be when the ordinary image is only visible; if a Nichol's

prism is used, the zero will be at the point where the light is excluded.

When we wish to obtain the value of the arc of rotation produced by a liquid, it is necessary to employ homogeneous light, and for this purpose red light is preferred, as it is the only homogeneous light that can be obtained by coloured glass: a disc of red glass is therefore placed between the eye and the analyzer.

If the liquid in the tube has the property of producing rotatory polarization, the secondary image becomes evident when a double-image prism is used. The analyzer should now be turned to the right or left (as the case may be) until the image disappears: the space traversed by the index from the zero indicates the arc of rotation. With a Nichol's the light will be no longer excluded at the zero, and the index must be turned until the ray disappears; the distance traversed by the index showing the arc of rotation. F. KITTON.

THE "CHALLENGER" EXPEDITION.

PROFESSOR WYVILLE THOMSON has recently communicated to *Nature* an interesting description of the results of their dredgings, from which it will be seen that this expedition is already beginning to yield rich zoological fruit. Several dredgings off the Portuguese coast were rich in the usual Atlantic ooze, but little else. After trying the ordinary trawl, the naturalists were fortunate enough in securing, off Cape St. Vincent, and at a depth of 600 fathoms, several new species of fish. Two of them belonged to the genus *Macrourus*, whilst another form was quite unknown to them, although approaching in many respects the genus *Mugil*. All the fishes were in a peculiar condition, from the expansion of the air in their bodies. The Professor goes on to say:—

"After this attempt we tried the trawl several times at depths of 1,090, 1,525, and finally 2,125 fathoms, and always with success.

"Several fishes, most of them allied to *Macrourus*, were added to the list. Several decomposed crustaceans, and among the lower crustaceans at 1,090 fathoms a gigantic amphipod, of the family Hyperina, allied to *Phronima*. The eyes of this creature are very remarkable, extending in two great facetted lobes over the whole of the anterior part of the cephalo thorax, like the eyes of an *Aeglina* among Trilobites. This crustacean, which is three and a half inches in length, makes a splendid drawing, and reminds one of the old Eurypterids, is in process of description at the hands of Dr. von Willemoes Suhm.

"Mollusca are very scarce in deep water, and our catches have hitherto been chiefly confined to such things as the species of *Nucula*, *Leda*, *Verticordia*, &c., familiar through the deep dredgings of the *Porcupine*. Among the molluscoids a haul in 1,525 fathoms gave us a lovely thing, a bryozoon, forming, out of branches closely resembling those of *Accromarchis neritina*, a graceful cup, the bases of the branches united by a transparent stem between two and three inches high, like the barrel of a quill, or the stem of a claret-glass. This genus, which presents a general character totally different from anything hitherto known among recent Bryozoa, I mean to dedicate to Captain Nares, as an early recognition of the confidence and esteem which he has already fully gained from the scientific staff. *Nàresia cyathus* certainly recalls, in a most singular way, the Cambrian *Dictyonema*, a form which I had, however, hitherto been inclined to refer to the Hydrozoa.

"The Echinoderms have yielded some exceedingly interesting species to the trawl; among them several examples of the beautiful little urchins, of which one specimen was taken by Count Pourtales, in the Straits of Florida, and described by Alexander Agassiz under the name of *Salenia varispina*. It is undoubtedly a true *Salenia*, and to an advocate of the doctrine of the 'continuity of the chalk,' it is pleasant to see in the flesh this little beauty, which has hitherto been reckoned among the lost tribes.

"Among the star-fishes two species of the genus *Hymenaster* have occurred, and the ophiurids are well represented, chiefly by large examples of several species of the genus *Ophiomusium*.*

"All the hauls of the trawl, down to 2,125 fathoms, have yielded many specimens of a singular Holothurid, of which a description will shortly be published by Mr. Moseley. The animal is of a rich violet-colour. Like *Psolus*, it has a distinct ambulating surface, with a central double line of water-feet. The body cavity is small, but the perisome is represented by an enormously thick layer of jelly, which rises on either side of the middle line of the back into a series of rounded lobes, each perforated for the passage of an ambulacral tube and corresponding therefore with an ambulacral foot. The upper pair of vessels of the trivium send out series of leaf-like sacs, richly loaded with pigment, which fringe on either side the ambulatory disc, and appear to be chiefly concerned in the function of respiration.

"Sea-pens and Gorgoniæ have occurred frequently, always remarkable for their brilliant phosphorescence. Captain Maclear is giving special attention to this beautiful phenomenon. A *Mopsea*, which shone very brilliantly, gave a spectrum extending from the green well on into the red, while *Umbellularia* gave a very restricted spectrum sharply included between the lines *b* and D of this wonderfully rare sea-pen. We took with the trawl a very fine spe-

* *Ophiomastix?*—ED. S. G.

cimen, with a stem 3 ft. long, at a depth of 2,115 fathoms, off Cape St. Vincent.

"As usual in deep-sea work, sponges preponderated, and the order has added several novelties, chiefly referrible to the ventriculite group, the Hexactinellidæ.

"Some fine new species of *Aphrocallistes* came up along the coast of Portugal, and off St. Vincent; with many spicules and more or less mutilated examples of Hyalonema, two or three species in a fair condition of a species of *Euplectella*, with spicules which I cannot distinguish from those of *Euplectella speciosa*—the Venus Flower-basket of the Philippines. The form of the two sponges is the same, but our own specimens are quite soft, the spicules not fused into a continuous siliceous network."

THE ARCHÆOLOGY OF RARE PLANTS.

I SHOULD be glad to say a few words in reply to Mr. Lees' onslaught on the suggestion, that the *Astrantia major* owes its existence in the wood on the Weo Edge, in Shropshire, to the Romans.

If Mr. Lees will kindly refer to my paper, he will find that the hypothesis which I have advocated was put forth merely as a conjecture, having *more probability* than any other which has hitherto been advanced, and that the word "inevitable," of which he has availed himself so much in blackening my argument and elucidating his own, was used by me in referring to the connection between the Roman villa at Acton Scott and the place where this plant grows, and not, as he represents, to the main proposition, that the Romans brought the plant with them. My words are, "The inference from this" (viz. the existence in the Roman villa of Pentamerous shells, which abound at the Weo Edge, and nowhere else in the neighbourhood) "is inevitable, the Roman mason who constructed the hypocaust used lime brought from the Weo Edge."

Mr. Lees is, I know well, an adroit and practised debater, an able and vigorous advocate of any cause for which he holds a brief, but I fear his earnestness has in this instance led him to do me some injustice. All I pretend or ask to show is, that among any amount of possible conjectures respecting the way in which the plant was first introduced into this neighbourhood, *the most probable*, that for which more reasons can be assigned than any other, is the theory I have advocated.

Nor can I think that my position is much damaged by the more direct arguments which Mr. Lees has brought to bear on it. It is a "most unlikely supposition" that the Roman workmen settled "on the top of a hill," and brought the plant with them; for "workmen in general do not *live* beside the quarry they get stone from." But at this very moment, the workmen who are employed in that particular quarry *do* live close by it. Then "the Roman who built the villa was most likely to employ British workmen to quarry the stone he wanted." No doubt, he may have done so, but he may not; and besides, the shells were found, not in the stone used in the building, but in the mortar of the hypocaust, which required more skill to manufacture than was probably possessed by the British workmen of the period, who may possibly have been employed. I suppose it is on the principle that any stick is good enough to beat a dog with, that Mr. Lees has assailed me with such arguments. Again, "It is the height of improbability that ordinary getters of stone should have had ornamental gardens close to the quarry, and nourished a flower there for ornament sake." It is also "quite incredible that any Roman legionary should have carried the Astrantia in his *impedimenta* across the Alps;" and because the Romans have, as far as Mr. Lees knows, left no vegetable traces of their dominion in Britain, except *Urtica pilulifera*, and perhaps the Box and Elm, it follows that no Roman ever, for some reason best known to himself, could have conveyed this plant with him. Now I have always understood that the *Anacharis alsinastrum* was brought to this country in some undesigned way, probably adhering to goods which came from America many years ago. If an insignificant water-plant like this could be so imported, if it is true that the homely thistle could be, by nobody knows who, introduced to Australia, where it has flourished to such an extent as to become a public nuisance, of what avail is any amount of imaginary improbabilities which my friend has put together in such picturesque array, against the positive evidence which has been brought forward that the spot was frequented by the Romans and those employed by them, and the inference that they may have brought with them a by no means inattractive or inelegant plant?

Let us examine, however, the more serious objections which my friend has urged. They will be found to resolve themselves into this—that there is nothing "to invalidate the claim of the Astrantia to be a true native of Britain"; that the plant has been "noticed growing at a particular spot from time immemorial." How it can have been "noticed" from "time immemorial" it is not easy to understand; since "nobody knows how long the Astrantia has been fixed in its present position," he prefers "going beyond the Roman mason, and with confidence ascribes its location on the Weo Edge to natural causes." This "nobody knows how long" and "time immemorial," and their important inferences, put one in mind of those utterances of the "oldest inhabitant" which are generally sufficient to silence all sceptics. What, however, is this indigenous origin of plants, which is to extinguish any

inferences as to their introduction drawn from observation, and from conclusions based on evidence? Does Mr. Lees mean that at some remote period the soil on the Weo Edge, under the influence of some mysterious energy, gave birth to a plant identical with its relative on the uplands of Switzerland? It is hardly fair to upbraid any one who has left off his evil ways, with the errors of earlier years; but I cannot resist the thought, that my learned and very able friend has hardly yet shaken off those views, which I believe he once held, as to the origin of species, and which no doubt he has in the main cast to the moles and bats, and that in this particular instance he is influenced by the impression that a kind of spontaneous creation of plants took place in different localities in some indescribable manner; otherwise I cannot account for his using such terms as "native" and "indigenous" in opposition to a possible, and even probable, account of the introduction of a plant. I shall be happy to hear that he repudiates the idea of a vague unaccountable origin of anything, for it has always seemed to me to strike at the root of all scientific investigation. We find ourselves surrounded with natural wonders of all kinds, fossils deeply buried in rocks, plants clothing the surface of the earth—if we are to be stopped at the very commencement of our researches into how these plants and animals came there, how they are related among themselves, and what is their history, by the assertion that they have been there time immemorial, that they are native, indigenous, there would be an end to all information on these most interesting problems; whereas if we start on the reverse principle, viz., that every plant, every fossil, has its own history, which it is our function to unravel as far as we may, ever holding any hypothesis which we may form respecting them, provisionally, and only in proportion to the evidence we can bring to bear upon it, then we may hope that as far as we advance our footing may be firm.

Mr. Lees names a number of other rare plants which grow in favoured localities throughout England, and seems to say that, because their introduction is a problem not to be easily accounted for, and because their range in this island is very restricted, he can see no reason or necessity for calling in the Roman mason to plant the Astrantia upon a Shropshire hill. It is not easy to see the force of this argument, nay, it would rather tend the other way, since it is probable that the more restricted and the more isolated such foreign plants are, the more probable it is that their existence is due to some accidental cause, than to that gradual development by regular descent from some common parent in a particular locality, to which it seems to me the term indigenous ought properly to be restricted; otherwise, it is not easy to see what limits should be placed to this time immemorial, which is to decide the indigenousness of a plant. If I find a tulip growing in the middle of Salisbury Plain, the plant may, for all I know, have been growing there from time immemorial. That other people did not notice it before, is no logical proof that it was not there. Of course this is an extreme case, but it may illustrate what I mean. For it would seem to me, with all due deference to more experienced naturalists, that the point of view in which we should regard any rare plant is that in which even Mr. Lees would unquestionably regard that tulip—namely, that it had some artificial or accidental mode of introduction, until the contrary has been proved; that we have even more reason to assume the Roman legionary toiling over the Alps with a bit of Astrantia carefully stowed away among his *impedimenta* in a choice bit of pottery, and piously planting it in his ornamental garden on the Weo Edge, in Stokesay parish, than to resort to the mysterious agency called by that beautiful term indigenous—that *deus ex machinâ* which my excellent and learned friend is so glad to invoke to solve his difficulties whenever it suits his purposes.

J. D. LA TOUCHE.

THE ORIGIN AND DISTRIBUTION OF THE INSECTS OF THE BRITISH ISLES.

ON the 25th of February last Mr. Edwin Birchall read a paper on this subject to the Leeds Naturalists' Field-Club and Scientific Association, with the object of offering some suggestions as to *whence* the insects of the British islands have been derived.

Fossil insects were first adverted to, and the earliest known forms from the Carboniferous rocks described. Insects have been in England most abundantly found in rocks of the Wealden and Oolitic periods: a large proportion of these are small coleoptera, and mostly of modern genera, and some cannot be distinguished from species still existing in England. "The poor beetle that we tread upon" surely deserves a better fate, when we consider that he has walked the earth unchanged since the days of the Iguanodon and Pterodactyle—compared with his, how short the pedigree of the proudest noble of mankind itself: to the Dor Beetle (*Geotrupes stercorarius*) probably belongs the title of "the oldest inhabitant of earth." The Lepidoptera of the Secondary period in England, so far as is known, were of a tropical character, and it seems useless to look for traces of any of our present forms until after the Glacial epoch: the conditions of climate during that period of desolation must have been such as to destroy or compel the migration southward of all existing species. In the main Mr. Birchall agreed with the propositions laid down by the late Professor Edward Forbes in his essay

on "the Geological Relations of the existing Fauna and Flora of the British Isles," published in 1846, and considered that the great bulk of our species of insects have been derived from Central Europe, as there is not a species which is universally distributed in these islands which is not equally so in Germany, but that traces still exist of several more ancient faunas and floras which are now confined to small and separate areas.

Forbes argued for the existence of four such sub-floras as,

1. A Mediterranean flora in the West of Ireland, derived from Spain, over land which we must suppose formerly bridged the gulf of 700 miles which now separates Ireland from the Iberian peninsula.

2. The flora of the mountain-tops of Scotland, Cumberland, Wales, and the North-west of Ireland, derived from Scandinavia and Iceland, supposed to have reached our shores, either by means of icebergs or over land, of which the Orkney, Shetland, and Faroë islands are the last remains above water.

3. A Kentish or Chalk Flora.

4. A Norman Flora, confined to South-western England and South-eastern Ireland.

Mr. Birchall suggested that the following species, several of which occur in the utmost profusion in the district of Western Ireland, where the peculiar Spanish flora is found, and are scarce or non-existent outside that very limited area, are remnants of the old Peninsular or Mediterranean fauna:—*Zygæna nubigena*, *Erastria argentula*, *E. fuscula*, *Lithosia caniola*, *Dianthæcia nisus*, *D. cæsia*, and *Notodonta bicolor*. He exhibited a number of lepidoptera from the mountain regions of England, Scotland, and Ireland, and was of opinion that such species as *Crymodes exulis*, *Zygæna exulans*, *Pachnobia alpina*, *Psodos trepidaria*, *Anarta cordigera*, *A. melanopa*, and many others, had certainly reached our shores from Scandinavia and Iceland. As regards Forbes's 3rd and 4th subdivisions, he did not think any evidence was to be obtained by a consideration of the Lepidoptera inhabiting the districts in question. There was, no doubt, a general similarity in the species found on the opposite sides of the English Channel, and there are a few conspicuous insects, probably of French origin, which do not wander far from our southern coast, but there seems no reason to assign a remote date for the naturalization of such insects as *Sphinx nerii*, *Deilephila euphorbiæ*, *Plusia orichalcea*, *Phlogophora empyrea*, *Pieris daplidice*, and *Argynnis lathonia*, which possess powers of flight sufficient at any time to enable them to cross the "silver streak."

Mr. Birchall also exhibited a large number of British Lepidoptera, contrasted with Continental examples of the same species, and pointed out that variation from the Continental (or what may be considered the original) type was so great, that in a large proportion of our species it is easy to say at a glance whether the specimen was British or foreign; thus indicating that the lapse of time since the migration or insulation took place has been sufficiently long to allow of great changes of form and colour, in many cases amounting to what we can scarcely refuse to call the development of a new species.

Specimens from the Isle of Man appeared to indicate that insular conditions have there operated with exceptional force.

Corsican and Sardinian Lepidoptera were also compared with Continental examples of the same insects, and were found to vary from the original types, still more than British insects do; thus probably indicating a longer period of isolation.

Specimens were also shown of *Nonagria concolor*, *Noctua subrosea*, and *Dianthæcia Barrettii*, the only three British micro-lepidoptera not known to have occurred on the Continent of Europe.

COMPARATIVE SIZE OF ANIMAL HAIRS.

THE hairs of animals are frequent subjects of interest to microscopists, and are figured in many of the popular handbooks. It is curious also

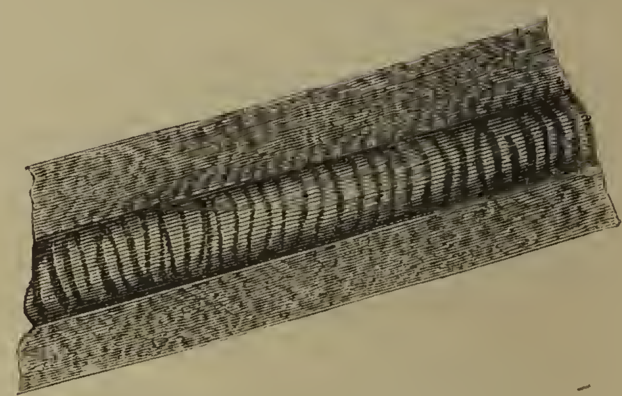

Fig. 64. Hair of Seal × 120.

to study their comparative sizes and proportions; and as I do not remember to have seen them thus

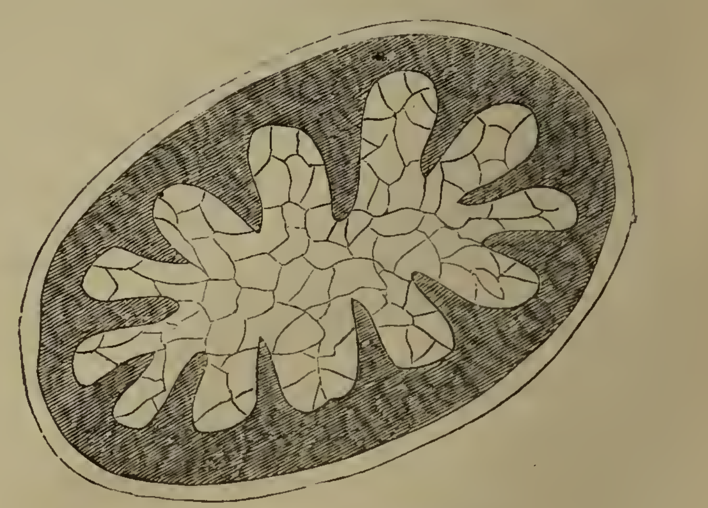

Fig. 65. Section of Hair of Peccary × 120.

noticed, perhaps the following sketches taken under the camera may interest some of your readers.

Fig. 66. Hair of Fallow Deer: A, tip of hair; B, root of ditto.

Fig. 67. Root of Human Hair × 120.

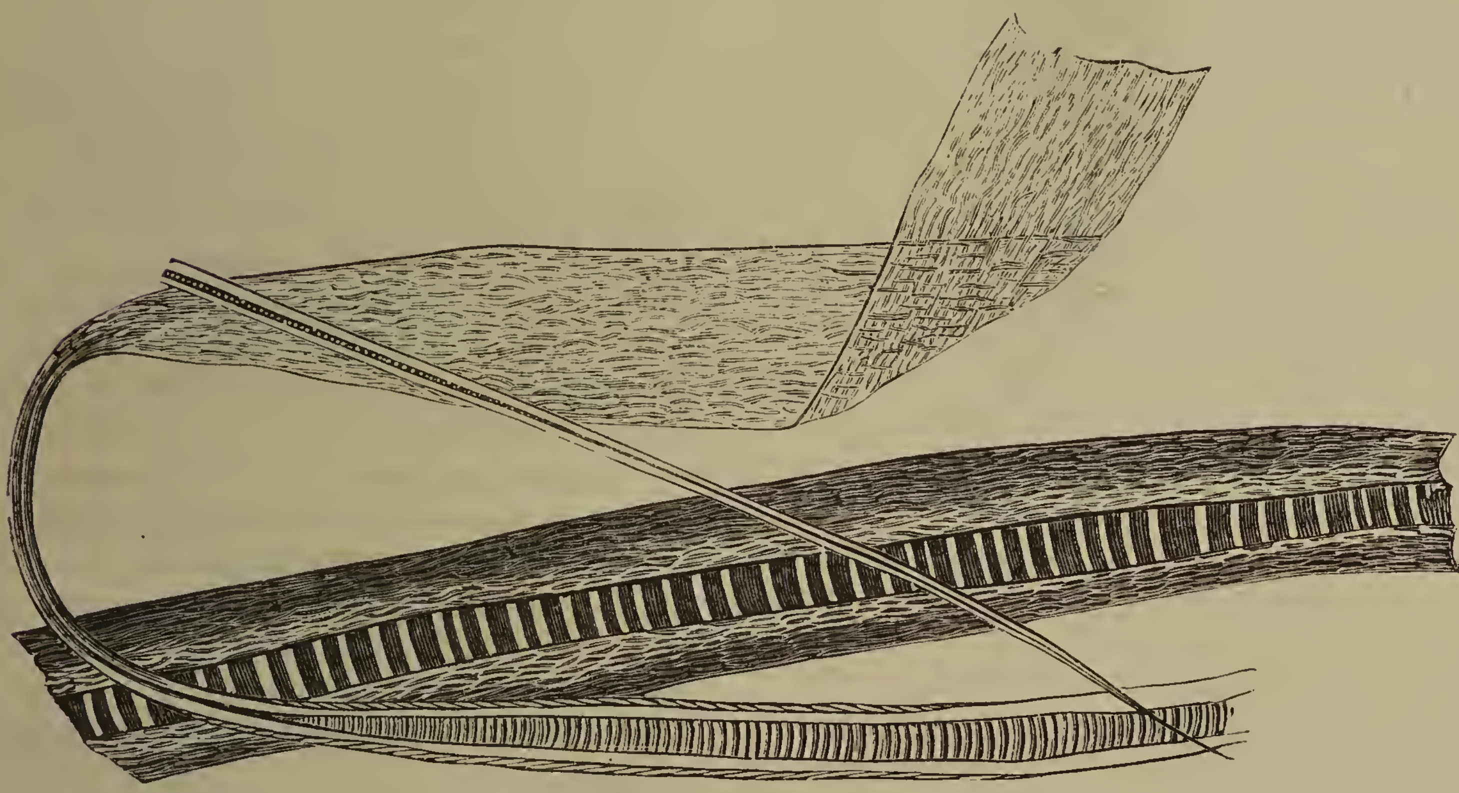

Fig. 68. Hairs of *Ornithorhynchus paradoxus*, New Holland.

The figures are all drawn under the same power, viz. $\frac{4}{10}$ objective and A ocular, magnifying about 120 diameters. The most remarkable of all I have noticed is the hair of the *Ornithorhynchus paradoxus*, one of the *Monotremata*, which is covered

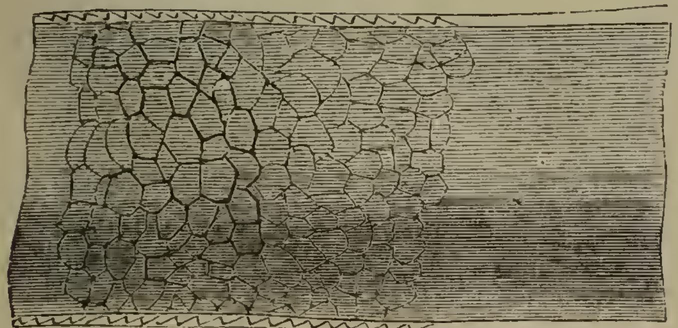

Fig. 69. Centre of Hair of Fallow Deer, showing polygonal cells × 120.

with brown fur. It is found only in Western Australia. The hairs are broad and flat in some

Fig. 70. Hair of Bat × 120.

parts, and in others, becoming narrower, they suddenly taper to a thread, and then widen out

again. The hairs of the Pekan, one of the Weasel family, said to be found in Canada and the Northern States of America, are curious for the structure of

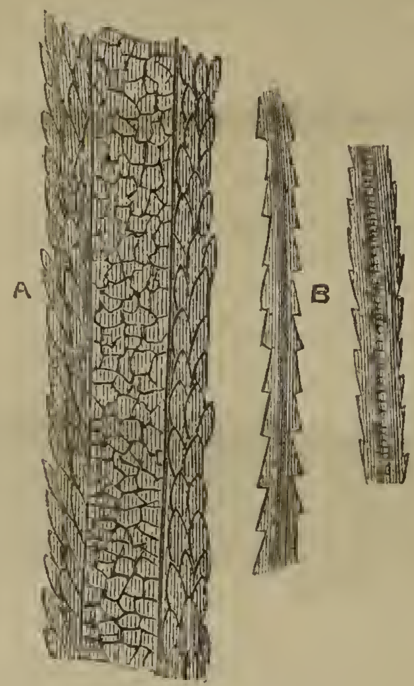

Fig. 71. Hairs of Pekan : A, large hairs ; B, small ditto.

the leaf-like cells or scales that surround the interior of the hair. The others are too well known to require further notice, and are only added for the

Fig. 72. Hair of Tiresias × 120.

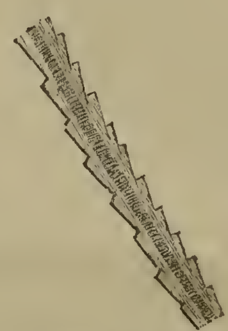

Fig. 73. Hair of Grey Fox × 120.

sake of comparing their relative sizes. I find Canada balsam and chloroform an excellent preparations for the preservation of animal hairs after

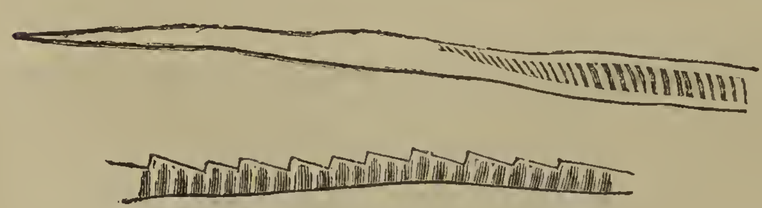

Fig. 74. Hairs of Mole × 120.

they have been cleaned in potash or soda; and many of them form beautiful polarizing objects.

R. H. Nisbett Browne.

"Life has been the medium through which the geological history of the past is connected with the unknown future,"—Taylor's "*Geology of Manchester*."

MICROSCOPY.

Dark Lines, &c.—In reply to the inquiry of "G. W.," I may say that I at first experienced the same difficulty in obtaining a good definition with the binocular with any power over an inch objective, and that I found a Webster condenser remedied the dark line he speaks of, and enabled even a low-angled 4-10ths to be used with comfort; also that a cap lens of crown glass of meniscus form, with a central stop, using also a small central stop in the diaphragm of the condenser, enabled me to get a dark ground illumination with the 4-10ths, superior in illumination and definition to the parabola.—*J. W. Meachen.*

Imperfect Mounting.—I have a few slides, mounted I think about twenty years ago, which should contain spiculæ of *Holothuriadæ*, but which, owing to improper manipulation or unsuitable medium, do not now show the least trace of any organism. The slides, from their neatness, seem to be the work of a professional mounter. I am, however, much puzzled to know what the mounting medium is. It is now quite yellow, and on removing one of the covering glasses I find it still soft, but, unlike balsam, it is elastic, and does not melt with heat. It smells somewhat like, and has all the appearance of, common glue. As it is a matter of very great importance to microscopists, I should much like to know the cause of the objects disappearing. Also whether any fellow-workers have noticed the same effect on calcareous spiculæ by balsam, as a few slides that I examined a short time since, although recently mounted, show serious symptoms of decay, the fine points having in some cases entirely disappeared. In the case of the slides of Holothuriadæ referred to, the loss is much to be deplored, as they were all preparations of exceedingly rare species, some of them indeed being marked type specimens.—*W. Swanston.*

Mounting in Damar.—I have mounted a great many things of late in the new substitute for Canada balsam,—gum-damar. It is very handy, inasmuch as it requires no previous warming. But I can make little use of it, as bubbles frequently rise, and are apparently difficult to break. I know not whether any of the readers of Science-Gossip have been more successful. If any one should ask me which I prefer, I should decidedly say Canada balsam. I wish the damar could be brought to more use, as it is undoubtedly much simpler to work with.—*W. S. Palmer.*

Mounting Diatomaceæ.—Diatoms, when arranged loosely on a slide, are almost certain to be thrown into confusion by the wave of balsam, in whatever manner it may be applied. If, however, the centre of the slip, or, preferably, the thin glass cover, be first smeared with a thin mucilage of gum

tragacanth, the diatoms may be placed on this film, and when arranged to the satisfaction of the operator, may be fixed by being gently breathed upon. After this the balsam may be applied without any danger of disturbing the arrangement, and the film of gum being transparent, becomes perfectly invisible. The breathing process, to soften the gum, may be repeated as often as required, so that each diatom may be fixed as soon as it is laid in its place, and corrections may be made in the grouping after the diatoms have been approximately arranged. With the same end in view, some microscopists place a little gum in the water in which the store of diatoms is contained; but this practice is objectionable, from the fact that the gum coats the frustules and frequently prevents the balsam from penetrating them; thus damaging or spoiling a slide which has taken a long time in arranging.—*F. W. M.*

Palates of Spiders.—I have been looking through the back numbers of Science-Gossip, and am surprised, in the paper on the alimentary system of the Spider (June, 1868), to see so little notice taken of what I consider a beautiful microscopical object—the palate of the spider. The structure is beautiful, and I am sure will repay the operator for the little trouble it will take to dissect a spider to obtain them. I would mention, that in many of my insect dissections, to save time I apply carbolic acid and heat, and then Canada balsam, the effect being that the acid renders them transparent, and the balsam running in after, they can be mounted in a few minutes, where, by the soaking in turps process, they would take hours or weeks. By this plan the palates of the Spiders can be seen *in situ*.—*F. Barnard.*

Diatoms and Foraminifera.—The following process I have found the best for mounting the latter in balsam. After arranging them (dry) on the slide, in the pattern desired, a drop of camphine should be applied to the slide, but not dropped on the objects, as that would at once displace them. The camphine will spread out, reach and become absorbed by the forams. A gentle heat should then be applied until the spirit has entirely evaporated, when the forams will be found to be sufficiently fixed on the glass to allow the usual mounting process to be carried out. I have usually applied and dried the camphine as described, three or four times before mounting, in order to prevent disappointment. Doubtless diatoms might be mounted in a similar way, but of that I have no experience. I should mention that I have always used camphine with balsam, and find it equal to anything else recommended.—*G. E. Ladbury.*

Microscopic Postal Cabinets.—The following is a scheme I wish to submit to the readers of Science-Gossip. Let a certain number of persons living in different parts of the country, say twelve, A, B, C, &c. &c., agree to form a postal cabinet association, with A as manager. A small entrance fee and subscription (a shilling in each case would probably be enough) would be paid by each member to the manager, who would provide a box capable of holding at least a dozen microscopic slides, and which should be as light as is consistent with the safety of its contents during its transmission by post. A would then put into the box an object likely to interest the other members, and forward it by post to B, who, after examining A's object, would add a slide of his own, and forward the box to C. C would add another slide, and send it to D, and so on; then when the box arrives in the hands of L it contains eleven slides; he adds a twelfth, and returns the box to A, who takes out his own slide, replaces it by a new one, and then sends it to the next member (B), who does likewise. Thus, when each person receives the cabinet, it contains eleven new slides and his own, which he retains. It would of course be necessary to have a code of rules, but they might be very brief. The most important would be one limiting the time each member could keep the box. With twelve members it should make the circuit in a month or five weeks. Two boxes might be established, so that each member might receive a fresh lot of objects about once a fortnight. I have borrowed the above idea from the system of MS. magazines, which has been adopted for many years by persons who use Pitman's phonetic shorthand. A further advantage would arise to the members of such an association as I have proposed, if each member were allowed to make brief notes as to his own object, or those of the other members.—*Alfred Atkinson.*

ZOOLOGY.

Appearance of the Camberwell Beauty.—During the past week two specimens of the Camberwell Beauty (*Vanessa Antiopa*) have been observed on the banks of the river Dee, Aberdeenshire.—*Wilcebe.*

Man and Apes.—This is the title of the first of two articles by St. George Mivart, F.R.S., the well-known author of the "Genesis of Species," which appears in the last number of the *Popular Science Review*. It is copiously illustrated, and sets forth in a clear and distinct manner the affinities and distinctions of the leading groups of the Quadrumana.

Wild Birds' Protection Act.—The following is the schedule of wild birds protected by the above Act, and to knowingly kill, take, or wound any of

which exposes the offender to a fine:—Avocet bittern, blackcap, chiffchaff, coot, creeper, crossbill, cuckoo, curlew, dotterel, dunbird, dunlin, fly-catcher, godwit, golden-crested wren, goldfinch, greenshank, hawfinch or grosbeak, hedgesparrow, kingfisher, landrail, lapwing, mallard, martin, moor (or water) hen, nightingale, nightjar, nuthatch, owl, oxbird, pewit, phalerope, pipit, plover, ploverspage, pochard, purre, quail, redpoll, redshank, redstart, robin redbreast, ruff and reeve, sanderling, sand grouse, sandpiper, sea-lark, shoveller, siskin, snipe, spoonbill, stint, stone-curlew, stonechat, stonehatch, summer snipe, swallow, swan, swift, teal, thicknee, titmouse (long-tailed), titmouse (bearded), wagtail, warbler (Dartford), warbler (reed), warbler (sedge), whap, wheatear, whinchat, whimbrell, widgeon, woodcock, wild duck, woodlark, woodpecker, wood-wren, wren, wryneck.

Spiders in St. Helena.—The Rev. O. P. Cambridge has recently sent a communication to the Zoological Society, on the Spiders of St. Helena, in which he states that the number of known species is forty. Eleven of these were now described for the first time, the communication being based on the collections made in the island by Mr. Melliss. Singularly enough, nearly all the species are European as regards their form.

Scientific Societies.—It may interest some of the readers of Science-Gossip to know that there is a very good society formed in the East end of London, entitled "The East London Naturalists' Society." Its end is the mutual improvement of its members in the study of the physical sciences. If any one should care to join this society, they may write to the Secretary, John W. Love, Esq., 23, Fairfoot Road, Bromley-by-Bow, E., who will forward them particulars of the society, rules, &c., on application.—*W. S. Palmer.*

BOTANY.

Botanists' Pocket-Book.—Mr. W. R. Hayward has just published a handy little volume bearing the above title, with which we are much pleased. It is the best thing of the kind we know of, and cannot but prove exceedingly useful, both to students and more accomplished botanists. It contains, in a tabulated form, the chief characteristics of all our British plants, their botanical and common names, soil, situation, colour, growth, and time of flowering. Each plant is arranged under its own order. The publishers are Bell & Daldy, London.

Fertilization of Grasses.—The mode in which the fertilization of grasses, and especially of cereals, is effected, has recently been the subject of a series of observations by Delpino in Italy, and Hildebrand in Germany. Both these observers are at issue with previous writers, who maintained that the flowers of cereals, and especially of wheat, were self-fertilized in the unopened flowers, and consequently that the process could not be influenced by the wind. Hildebrand asserts, on the other hand, that impregnation takes place while the flower is open, and while the stigma is in a condition for the access of foreign pollen, that is, from other flowers. The opening of the flower of wheat, however, is completed in such a very short space of time that in a wheat-field there is probably never more than one in 400 of the flowers open at the same time. The contrivances by which in this case, as well as in other grasses, cross-fertilization is at least rendered possible, are described in detail in the paper. In barley, on the other hand, the majority of the flowers never open, and self-fertilization is the only condition possible. Delpino states, however, that there are in an ear of barley a very small number of flowers differently constructed from the rest, in which cross-fertilization is possible. In the Oat the process is stated to vary according to the weather; in fine warm weather the flowers open freely, and cross-fertilization is favoured; in cold wet weather they remain closed, and self-fertilization is inevitable. In Rye, fertilization from the pollen of other flowers is provided for. The agent in the dissemination of the pollen is scarcely ever insects, almost invariably the wind, to which end both stigma and pollen-grains are specially adapted.

Saxifraga florulenta.—For many years there was so much mystery regarding this plant, which is still unknown to most botanists, that some account of it may be interesting to the readers of Science-Gossip. Some thirty years back a coloured drawing of a newly-discovered Saxifrage was brought to Mons. Veranni, a botanist at Nice, said to have been discovered at St. Martin de Lantosco, a district in the maritime Alps north of Nice, almost unknown, a sort of *terra incognita*, being distant from any frequented route. For many years afterwards it was generally believed that such a plant did not exist, that it was in fact a myth, till Professor Moris, of Turin, director of the Botanic Garden, sent the head gardener, with two or three others, in search of it, who, after scouring the district of St. Martin for three whole days, discovered the plant in flower, and brought away several specimens, one of which Mons. Moris was kind enough to give me, as he had already done to several Italian and Swiss botanists; among others, Mons. Decandolle, who had already given, in his "Prodromus," a description of it, taken no doubt from the drawing referred to. Mons. Edmund Boissier, of Geneva, and Mons. Reuter, director of the Botanic Garden, there, afterwards made an unsuccessful search for the plant at the spot indi-

ca'ed, and I have not heard that it has been found since. In the "Tourist's Flora" of Joseph Woods, published in 1850, it is thus described: "Root leaves lanceolate mucronate ciliate, stem leaves linear, stem hollow, flowering from base, and forming a thyrsoid raceme. Mountains of Nice, D. C.; not noticed by Duby or Bertoloni." The plant is about four inches in height, with a dense ovoid raceme covering the whole plant from the bottom. In the drawing it is represented as closely branched, and of a bright red colour. It would give me much pleasure to have additional particulars, should this meet the eye of any reader possessing further information regarding it.—*T. B. W.*

Valeriana pyrenaica.—Whatever may be advanced in behalf of *Astrantia major*, few botanists will be disposed to accept the claims of *Valeriana pyrenaica* to British citizenship. To use Dr. Hooker's words, "it has no pretensions to be considered indigenous." As to the other plants mentioned by Mr. Harrison in the same conjunction, *Helleborus viridis* is of course always open to a certain amount of doubt. Of *Epilobium angustifolium* there are two forms. The first, or typical state, *macrocarpum*, is undoubtedly native, and much more common than was supposed by our earlier botanists. It is recorded for all Mr. Watson's provinces. The second, *brachycarpum*, with "buds very oblique, and capsules 1—1½ inch," is "only known in cultivation, and as a garden escape." It would be interesting to know to which form Mr. Harrison's plant belongs. *Brachycarpum* is not recorded in "Comp. Cyb. Brit.," any more than *Valeriana pyrenaica*, for province 8, which includes Derbyshire, though it is given for Yorkshire. If the suggestions of Mr. Robinson, in his interesting works on gardening, are at all generally carried out, there is likely to be a great increase in the number of false records, both of British and exotic plants in wild seeming localities.—*R. A. Pryor.*

The British Isoetes.—Seeing "T.B.W.'s" notice respecting the genus *Isoetes*, a few remarks on the British species may not be out of place. There are, I believe, three species of Isoetes that may be called British. Two of these, viz. *Isoetes lacustris* and *Isoetes echinospora*, inhabit Britain proper; the third, *Isoetes hystrix*, has only been observed in one of the Channel Islands, viz. Guernsey, on l'Ancresse Common. I see that "T. B. W." does not mention *echinospora* in his article. The two first are very limited in their distribution in Britain, when compared with other aquatic plants. They are both found in lakes in the vicinity of Llanberis, North Wales, where *echinospora* was first discovered by Mr. W. Wilson, and afterwards by Mr. C. C. Babington; and specimens were sent to M. Gay, of Paris, who determined them to be *Isoetes echinospora*. It was also found in Scotland by Mr. Babington and Dr. Balfour. The habitat is different; *echinospora* is never found except the bed of the lake is composed of peat. The two may be distinguished when growing together by the lighter green colour of the leaves of *echinospora*. *Isoetes hystrix* was discovered in 1860 by Mr. G. Wolsey, of Guernsey, who found it on l'Ancresse Common. Specimens were sent to Mr. Babington, who named it *hystrix*, and the name was confirmed by M. Durieu de Maisonneuve and M. J. Gay, who are the best authorities on the genus. "T. B. W." mentions that it may be another species, but I think there is no doubt that the Guernsey plant is *hystrix*.—*Thomas Bates Blow, Welwyn, Herts.*

Botanical Locality Record Club.—Dr. F. Arnold Lees, F.L.S., and Mr. Thomas B. Blow, are now forming a club with the above title. The club proposes, by means of corresponding members, to collect and record the localities of the rarer British plants, which lists of records will be published and distributed to members at the end of each year. By the working of such a club a correct knowledge of the distribution of British plants will be arrived at. It will also aid in ascertaining whether certain species which are thought to be extinct are really so. One hundred members in England, Scotland, and Ireland are wanted to commence. All who wish to become members, and are willing to aid in the formation of such an association, are requested to address Thomas B. Blow, Welwyn, Herts, who will supply full particulars.

GEOLOGY.

The Pleistocene Age.—A capital article, from the pen of Mr. Boyd Dawkins, F.R.S., appears in the April number of the *Popular Science Review*. It is entitled the "Physical Geography of the Mediterranean during the Pleistocene Age," and deals with the distribution of sea and land during that important and geologically recent period. Our geological readers are strongly advised to get it and study it for themselves.

The Tree-Ferns of the Coal-Measures.—Mr. W. Carruthers, F.R.S., has recently read a paper on the above subject, before the Geological Society, showing the relation of the carboniferous species to other living and fossil forms. After referring to the remarkably uniform character of the order of Ferns throughout their whole history on the globe, the author pointed out that there existed in the Coal-measures two very distinct kinds of fern-stems, each represented by several species. Both of these were very different from the *Chelepteris* group already described by the author in the Journal of the Society. The first group had a stem-structure like that of living tree-ferns. In them

the vascular elements of the stem formed a closed cylinder round the pith; and the vascular bundles for the leaves were given off from the out-turned edges of the cylinder, where, at regular intervals, corresponding to the position of the leaves, narrow meshes occur for this purpose. To this group were referred the stem described by Lindley and Hutton as *Caulopteris Phillipsii*, and several hitherto undescribed species from Radstock and Newcastle. No materials had yet been detected which could throw any light on the foliage or fruit of these fern-stems. The second group included some stems the casts of which the author had obtained from Radstock, and the root-structures from Halifax. By the help of a fine series of specimens in the collections of the British Museum, he was able to correlate the different parts of these plants. The stems had been described by Corda under the name of *Stemmatopteris*. They differed from the other group chiefly in having the ends of the vascular plates, as seen in the transverse section, turned inwards, and having the bundles of the leaves formed in a complete condition in the axis of the stem. The author showed that the relation of the different parts of the stem in the species of *Caulopteris* was the same as in a first year's dicotyledon, while in the latter group the analogy of the structures was with the monocotyledonous stem. The roots, which surrounded the older portions of the stem, formed the well-known genus *Psaronius* of Cotta; and as this was the earlier name, it was proposed to retain it for the genus. There was associated with all the fine specimens of this group, foliage which had been described as *Cyatheites arborescens*. Although this had not been observed organically connected with the stems, Mr. Carruthers adduced several reasons for believing that it belonged to them. If this connection could be established, it was of the greater importance, as this form was known in fruit; and the fruit established that its affinities were with the living Alsophilas and Cyatheas. Many species of this genus occurred in the continental coal-fields; but the author believed that all the specimens found in England, though differing considerably amongst themselves, belonged to a single species.

Origin of Clay-Ironstone.—This was the subject of a paper lately read before the Geological Society of London, by Mr. J. Lucas, F.G.S. After having given a general view of the varieties, chemical composition, and mode of occurrence of clay-ironstone, he suggested that the formation of all the bedded varieties may be explained by the supposition that they originated in peaty or non-peaty lagoons on the alluvial flats of the deltas of the Carboniferous formations, which would present semi-terrestrial conditions, that is to say, a surface exposed to the air, but subject to be covered by floods. Carbonic acid formed in the lagoons from decomposing vegetable matter, meeting with protoxide of iron in solution, would unite with it to form carbonate of iron, which, with the mud of the lagoon, would produce clay-ironstone. Thus, in the author's opinion, the beds of clay-ironstone, like coal-beds, mark terrestrial horizons. The author supported his views by reference to various sections, and also cited the occurrence of what he regarded as an analogous phenomenon on a small scale in some mud obtained from the shore between Redcar and Saltburn.

The Antiquity of Man.—Sir John Lubbock has recently sent the following communication to *Nature*:—"I have received a letter from Mr. Edmund Calvert, in which he informs me that his brother, Mr. Frank Calvert, has recently discovered, near the Dardanelles, what he regards as conclusive evidence of the existence of man during the Miocene period. Mr. Calvert had previously sent me some drawings of bones and shells from the strata in question, which Mr. Busk and Mr. Gwyn Jeffreys were good enough to examine for me. He has now met with a fragment of a bone, probably belonging either to the Dinotherium or a Mastodon, on the convex side of which is engraved a representation of a horned quadruped 'with arched neck, lozenge-shaped chest, long body, straight forelegs, and broad feet.' There are also, he says, traces of seven or eight other figures, which, however, are nearly obliterated. He informs me that in the same stratum he has also found a flint flake, and several bones broken as if for the extraction of marrow. This discovery would not only prove the existence of man in Miocene times, but of man who had already made some progress, at least, in art. Mr. Calvert assures me that he feels no doubt whatever as to the geological age of the stratum from which these specimens are obtained. Of course I am not in a position to express any opinion on the subject, but I am sure that the statements of so competent an observer as Mr. Calvert will interest your readers."

The Sub-Wealden Exploration.—The second quarterly report of the Committee managing the Sub-Wealden Exploration, has just been published. Recently, Messrs. Bristow, Topley, and Drew have been over the ground, and these geologists are satisfied that the site of the boring is by far the best that Sussex presents for the purpose. On January 28th, at a depth of 131 feet, the borers came across a mass of stratified, pure white, crystalline gypsum (statuary alabaster), over four feet in thickness. This was succeeded after ten feet of gypseous marl, by another bed of alabaster, three feet thick. This is a valuable material; so that, so far, the boring is not without economic importance. The belief is that the borers have now reached the lower strata of the Purbeck series.

NOTES AND QUERIES.

The Hydra.—In the March number of Science-Gossip, a correspondent appears to doubt that the hydra possesses any stinging properties to paralyze its victims; and quotes from Mr. Lewis's book, wherein he says, "that he had watched those animals that had apparently been stung by the hydra, and found that after lying at the bottom a short time, they swam away apparently nothing the worse." He also states that "the same effect was produced on the water-flea, when touched with a needle." Your correspondent asks, "Is not this a proof of the water-flea shamming death?" I never saw an instance of their shamming death, and I have had many thousands of the *Daphnia pulex*, and have examined them for particular purposes. In some instances I have kept one alone in a wine-glass to make observations on it, as to the progress of the ova, or young, &c. (as they are oviparous and ovoviparous). I have repeatedly taken it out with a dipping-tube, placed it under the microscope, and then, after making an observation, have returned it to the wine-glass, but have never seen any of them sham death. I have used needles to move them into different positions for observation, but the needle took no effect on them. In fact they are never still, and when they come in contact with the tentacle of the hydra, they invariably continue to struggle, slower and weaker, until quite dead. Sometimes the hydra will immediately lay hold on five or six daphnias directly I put them in for the hydras to feed; they may, perhaps be satisfied by swallowing three fleas, and, relaxing their hold on the others, they sink to the bottom quite dead, and if not removed will soon decompose, and render the water unfit for living animals. I have never seen the daphnia recover from the effect of coming in contact with the hydra, and if small water-worms are given to the hydra, the effect of that paralyzing power is instantaneous, which I think is strong proof that the hydra possesses those stinging properties.—*J. Fullagar.*

Ipswich Amber.—I have lately seen a variety of ornaments made of the so-called Ipswich amber, and should be very glad if some of your readers could inform me as to its real nature and origin. Is it, as has been suggested to me, a *manufactured* article, or is it a genuine amber? If the latter, whence is it procured, and what are the organisms contained in it?—*C. D.*

Preserving Colour of Plants.—In answer to Mr. Harrison's inquiry in the January part of your magazine, respecting the possibility of preserving the colour in plants, the natural colours of which when dried are apt to change, I beg to suggest the following method, which was first discovered and applied by an experienced botanist, and which has hitherto given satisfaction to whoever has given it a fair trial. The plant to be dried is, while fresh, laid between several sheets of blotting-paper in the position which it is to occupy, then a large moderately heated smoothing-iron is rapidly passed over the blotting-paper, backwards and forwards, until the plant is sufficiently dried. Then the leaves, flowers, and delicate parts are arranged on the paper where they are to remain, and the iron is again passed over them until they are incorporated, as it were, with the paper which they occupy. A little nicety is necessary with regard to the regulation of the temperature, but a few trials with care and patience, will soon afford the requisite skill, if the iron at first be not too strongly heated. Many plants which, by the ordinary methods of drying, lost their delicate colours, have, by this method, been made to retain the colouring of nature. To the travelling botanist this method of drying plants is simply invaluable. I should be glad if you could tell me which is the best method of preserving the ovum in the shell of a fowl's egg—to form preparations illustrating the development of the chick in the egg.—*C. F. Diggle.*

Act for Protection of Wild Birds.—No doubt most of the readers of Science-Gossip are admirers of our native birds, and would be very sorry to have any kind exterminated or much lessened, not only on account of the disastrous effect on agriculture, but for the charm they add to rural scenes. The Act passed last year came into force on the 15th March, for the protection of certain wild birds during the breeding season; it is good so far as it goes, but to prevent it being a dead letter, in some rural districts, it will pretty much rest with the public to make the law known, and to help to enforce it by giving information to the police of any infringement of it that may come under their notice. There are some strange omissions in the list of protected birds, such as the skylark, thrush, blackbird, starling, &c.; but it is to be hoped that these and others will eventually be included. Any number of caution placards, with a list of protected birds, may be had on application to John Colam, Esq., 105, Jermyn-street, London, S.W.—*H. Budge.*

The Devil's Coach-horse (*Ocypus olens*).—One hot sultry day last September, with net under my arm and boxes in my pocket, bent on an entomological expedition, I chanced upon a group of Devil's coach-horses, whose actions I watched with great interest. An excellent opportunity was afforded me of witnessing the extraordinary ferocity of this beetle, which is thus commented on by Wood:—"It is one of the most courageous and ferocious of insects, attacking any enemy without the least regard to disparity of size. If one of these beetles be seen running along the path, and the point of a stick be presented to it, up goes its tail in a moment, and, with extended jaws, it bites the stick as fiercely as if it could annihilate its supposed enemy. And however closely it may be pressed, it never runs away like other beetles, but retreats slowly, with its face to the enemy, fighting to the last." These delightful insects were contending for the possession of a large snail, crushed by the foot of some careless or ruthless passer-by, and although the mollusc was of dimensions sufficient to have made them all an ample meal, they could not enjoy it in peace together, but fought like angry curs anent a bone. At last one enormous individual succeeded in driving the rest away. I took a pleasure in annoying this gentleman with a small twig, which it seized with much fury, turning up its tail in the manner peculiar to the species. After thus amusing myself for some time, I left it undisturbed, and plunging deep its mandibles, it devoured the succulent juicy morsel with a gusto an epicure might have envied. But there is a tragic ending to my story: Having returned from a somewhat successful hunt, I once more sought the scene of the encounter, but, alas! some less pitiful spectator had been there, and a horrid sight of decapitated trunks met my eye. One of these was still jerking spasmodically, and when I brought my finger into contact with its tail the movements increased in rapidity. It is said that this beetle has the power of emitting a very

disagreeable odour; though I have constantly made its acquaintance, I have not noticed this.—*Joseph Anderson, jun.*

Fleas in Winter.—"What becomes of the fleas in winter?" I have sometimes been asked, for, as a general rule, they occasion little annoyance to the human species during the winter months, though many animals are pestered with them "all the year round." In a curious old calendar of "natural phenomena," I find recorded not merely the month when these insects get lively, but an exact date in February given when "fleas begin to bite," a date it is perhaps kindness to suppress. In the winter of 1872-73, it has been observable that the mild temperature and, possibly, the humidity of the air, have kept fleas on the move, and many persons have noticed the unusual annoyance they have caused at a time when such is not looked for. Doubtless there is a succession of broods during the greater part of the year, and the new spring brood may be produced by some "old stagers" who winter in odd nooks and corners, unless, indeed, eggs are deposited in autumn, and remain unhatched until the spring. —*J. R. S. C.*

Definition of Structures.—In examining the minuter parts of the smaller floral structures, for instance the very minute scales of the glumes of some grasses, I find the best magnifying glasses are frequently ineffectual in discovering and clearly and distinctly defining what is required, namely, the form, position, &c., of the object under examination, whereas the lowest microscopical power, by reducing the field, fails also to answer the necessary purpose. Can you, or any of your correspondents kindly aid me in this matter? Is there any instrument especially adapted for the purpose needed by me, and where obtainable?—*Charles Thomas.*

Skeletons of Animals.—I have found the following a good method for preparing skeletons. After "catching your hare," skin it and boil it down slowly until the bones separate readily from the flesh—they will so better when hot,—wash the bones well in soda-and-water to remove all grease; then soak the bones in chloride of lime and water for three or four hours, and lay them out in the sun to bleach. In animals of the size of a cat, and smaller, great care must be taken to lose none of the small bones in the feet. After cleaning one foot it is a good plan to place the bones in a small muslin bag, before proceeding to the next, carefully marking each bag. In small animals a wire should be run up the backbone to keep the vertebræ in their proper order. This will save a good deal of bother if the carcase boils to "rags," as sometimes is the case. If the body cannot be got into the pot, it must be cut up, but take care to injure none of the bones. If "T. A. R." wishes for any more information, I shall be happy to give him any I can, if he will send his address.—*A. C. Hervey, Pokesdown, Bournemouth.*

Localities of Rare Plants.—It is very refreshing to find, from many of your valued correspondents, that several rare indigenous plants are yet to be found in various parts of the kingdom. I am afraid that, as the localities are given, ruthless collectors and fancied botanists will, in their ignorant selfishness, soon bring about what every true lover of the science would deplore, *i. e.*, their almost entire disappearance. I would therefore take the liberty of suggesting to your readers that any one who may know of the locality of any rare plant, should not give it in his communication, but offer to send it to any botanist, in case he would apply for it direct, and send a stamped envelope. Last year I went twice to Red Hill for the sole purpose of finding the *Mespilus germanica,* which is said in the local and other floras to grow between that place and Nutfield. I made a very diligent but unsuccessful search, and as I saw many new houses on that line of road I could not help fearing the tree had been cut down or destroyed. I have not the privilege of knowing any botanist residing near Red Hill, or I would have applied to him, but if any of your correspondents can give me precise information as to where that rare tree may be found, and communicate direct with me, I should be truly grateful.—*H. E. Wilkinson.*

Can a Queen Bee Sting your Hand?—On page 69 your correspondent Mr. Hunter says, "I cannot now receive the new opinion, that the queen bee cannot do what has been so often described;" but he also says, "I never knew her majesty make any attempt to vindicate her outraged dignity." Now this should convince him that the queen is not endowed with the power to sting the human flesh, as I have handled hundreds of queens in raising Ligurian bees, and never could make the queen use her sting, whatever provocation I have adopted. I have often compelled them to show their sting by squeezing their abdomen, and then I have put the sting against the back of my hand, but I could never make the queen sting me whatever I did—nay, you may pull the queen to pieces and you cannot make her sting you. This is a very wise provision of nature, as, if the queen was to use her sting like a worker bee, at the least provocation, the colony would come to grief whenever a queen was touched, provided there were no brood or eggs in the comb from which the bees could raise another queen, as the bees always die after they have left the sting in your flesh. The queen bee never uses her sting except in combat with another queen or to destroy royal brood. I have seen many such combats, and have put both fertile and unfructified queens down the hole in the top of my unicomb-revolving observatory hive to see the result. The bees have gradually drawn the two queens nearer to each other, by leaving the way towards the other queen more open, as if instinct taught them to know what was to take place—a thing they had never experienced before. As soon as the queen belonging to the hive has caught sight of the strange rival, she has rushed upon her, seizing her with the jaws and poising her abdomen, giving the fatal thrust with her sting almost before the strange queen has recovered from her surprise amongst her new subjects. The old queen of the hive is generally victorious in these royal duels, unless she has a young and active queen to contend against, when the vigour and strength of youth often gain the victory. Whether it is their old queen or the stranger that survives the encounter, the bees seem to pay them equal deference, and the body of the defunct queen is carried out of the hive without any respect being paid to the illustrious dead. Mr. Hunter also says, "the queen when handled makes no attempt to fly." I find a young queen often takes flight, even when the comb is gently lifted out of a hive, and if you handle her will immediately take flight as soon as she can get her liberty; but it is different with an old queen, as she is loaded with eggs, and is not inclined to fly; but a queen bee is not made for flight, as the two great sacs or inflated air-vessels

found in the abdomen of the worker bee are entirely wanting in the abdomen of the queen, and their place is filled up with her ovaries; and when the queen flies, her abdomen hangs down as a dead weight, as I have often seen when they have gone out, or returned from their matrimonial excursion, or come out in swarming.—*William Carr.*

SNOW-BUNTINGS, &c.—It may be interesting to your readers to know that we have been visited during this winter by large numbers of the Snow-Bunting and Mountain Finch. The Siskin and the Twite also put in an appearance, and the Grasschat paid us a visit on March 11th, when the ground was almost covered with snow. Our fells are white at this date, April 7th.—*A. P., Darlington.*

THE CUCKOO.—It has often been a matter of curiosity to me to endeavour to ascertain why all our feathered friends have such an aversion to the cuckoo. For several days during last spring a male and female cuckoo haunted our garden at intervals; the male perching on the wall and bowing and coquetting as he shouted forth his song, then as the female (which, unlike most females, is almost voiceless) came sweeping up he would take to flight, and glide hawk-like over the neighbouring fields, leaving her to follow humbly behind. I have said that the female cuckoo is voiceless, or nearly so—the *almost* was a cautious reservation as I am rather in doubt at present to which sex to attribute the loud bubbling whistle occasionally heard from a cuckoo. The half-laughing cackle proceeds from the male, and is often a continuation of his more familiar cry. The pair of cuckoos (by the bye is it not rather unusual to see a pair in company?) mentioned above made several visits to the garden, and on each occasion met with very disrespectful treatment from the birds in the neighbourhood—the swallows from the chimney shrieked at them loudly, the colony of sand-martins from the quarry close by mobbed them in a body, the blackbirds and thrushes rang out their insults, the usually peaceful starlings flung terrible imprecations on their poor heads, and a missel-thrush, bold in his wrath, anathematized them in the most *récherché* Billingsgate. Several times the cuckoo has appeared in a shrubbery close by, and on each occasion the hitherto merry songs of the feathered inhabitants have changed into hoarse cries of anger and defiance. The following incident which came under my notice some years back will show the detestation in which the cuckoo is held by the rest of the feathered tribe. A cuckoo by some means or other had entangled its legs in the tiles of our house, and was totally unable to extricate itself. Its helpless condition was soon discovered by the small birds living in the vicinity, and they came from all directions to exult in its misfortune. The staid, grave old house-sparrows left the eaves, and the gaudy finches from the neighbouring trees all crowded down to see the unfortunate bird and to assist in the mobbing that took place. And never was any poor bird so foully abused—they hissed him, they hooted him, they struck him with their bills, and scolded and chattered with all their might till a fresh actor came on the scene in the shape of a man with a prop, who in endeavouring to rescue the unfortunate bird hit it an unlucky blow on the head and thus caused its death. It was a very fine specimen. Other instances of cuckoo-mobbing have come under my notice, and the most justifiable excuse for such attacks is the popular belief that the cuckoo has a predilection for eggs; but then why should it be singled out for such open tokens of hatred, while the magpie and jay, both of which are inveterate egg-suckers, are seldom molested? Or is it possible that the birds are impelled by a virtuous indignation to show their contempt and disgust for such an unnatural parent, which, though anxious to continue its race, is unwilling to bring up its progeny itself, but rather commits it to the unsolicited attentions of a strange nurse? This however is merely a romantic hypothesis, and I should greatly like to see a practical explanation, or reasonable supposition on the subject.—*W. H. Warner, Kingston, Abingdon.*

WHITE APPLE.—Audubon, in the journal of his excursion to the Great Western Prairies, as given in his interesting life by Buchanan, says, "When sailing up the Big Sioux River they found on the river's bank the white apple, much used by the Indians for food, which they dry, pound, and make into a mash. It is more of a potato than apple, for it grows six inches under ground, and is about the size of a hen's egg. It had no flowers, the root woody, leaves ovate, and attached in fives." The ample and very interesting replies to my query respecting the *Compass-flower*, which have appeared in the SCIENCE-GOSSIP from your American correspondents, and for which I beg them to accept my thanks, induce me, with your permission, to ask if the "white apple" is known, and if so, what is its botanical name, its qualities, and peculiarities?—*James Pearson.*

LUMINOUS FUNGI.—I find under "Notes and Queries" in SCIENCE-GOSSIP for March, some remarks concerning "luminous fungi." As the light spoken of was seen on a post, may it not have been caused by phosphorescent wood? When taking a walk one very dark autumn night at Linton, North Devon, my attention was attracted to a luminous object in a hedge, which, on cautiously feeling my way towards, I found to proceed from some decayed bark on a tree. It emitted a sort of waving light, which was so bright that I could clearly see the time on my watch by it. I think the following particulars extracted from "Himalayan Journals," written by Joseph Dalton Hooker, M.D., R.N., F.R.S., will be interesting both to your correspondent and many of your readers:—"The phenomenon of phosphorescence is most conspicuous on stacks of firewood. At Dorjiling, during the damp, warm, summer months (May to October), at elevations of 5,000 to 8,000 feet, it may be witnessed every night by penetrating a few yards into the forest—at least it was so in 1848 and 1849; and during my stay there billets of decayed wood were repeatedly sent to me by residents, with inquiries as to the cause of their luminosity. It is no exaggeration to say that one does not need to move from the fireside to see this phenomenon; for if there is a partially decayed log amongst the firewood, it is almost sure to glow with a pale phosphoric light. A stack of firewood collected near my host's cottage presented a beautiful spectacle for two months (July and August), and on passing it at night I had to quiet my pony, who was always alarmed by it. The phenomenon invariably accompanies decay, and is common on oak, laurel (Titranthera), birch, and probably other timbers; it equally appears on cut wood and on stumps, but is most frequent on branches lying close to the ground in the wet forests. I have reason to believe that it spreads with great rapidity from old surfaces to freshly-cut ones. That it is a vital phenomenon, and due to the mycelium of a fungus, I do not in the least doubt, for I have observed it

occasionally circumscribed by those black lines which are often seen to bound mycelia on dead wood, and to precede a more rapid decay. I have often tried, but always in vain, to coax these mycelia into developing some fungus by placing them in damp rooms, &c. When camping in the mountains I frequently caused the natives to bring phosphorescent wood into my tent, for the pleasure of watching its soft undulating light, which appears to pale and glow with every motion of the atmosphere; but except in this difference of intensity, it presents no change in appearance night after night. Alcohol, heat, and dryness soon dissipate it; electricity I never tried. It has no odours, and my dog, who had a fine sense of smell, paid no heed when it was laid under his nose."—*G. J. Louis Lamarque, Dover.*

Showers of Frogs and "Manna of the Desert."—"J. R. S. C.," in his notice on this subject in Science-Gossip for April, might have added the instance adduced in the numbers of Science-Gossip for March and August of last year, under the head of "Manna of the Desert," which go far to show that, like the *Lichen esculentus*, frogs, fish, gnats, larvæ, &c., may be taken up by the strongest winds or whirlwinds, and after traversing the air for many miles, fall in the manner described. While on the subject I may take the opportunity of referring to Mr. Munby's observation on the Biblical statement that the manna which remained over the Sabbath "did not stink." In Exodus xvi. 23, a direction is given which would prevent decomposition, viz. by *scalding*. "Bake that ye may bake to-day, and *seethe* that ye may seethe." A clerical friend who entirely assents to the reasoning in the two former articles, has drawn my attention to what he considers an important addition.—*T. W. B.*

Œanthe crocata is the Water-drop Wort; the Water Hemlock is the *Cicuta virosa*, and there is also a plant called the Water Parsnip, the *Sium nodiflorum*. Neither of these roots has a *sweet* taste; so I am at a loss to determine what the poisonous root mentioned by "G. L. Cornish" could have been. The treatment in cases of poisoning by Water-drop Wort is an emetic. Twenty grains of sulphate of zinc, or thirty grains of ipecacuanha, or even common mustard, if the other remedies are not at hand. Great promptness is requisite, and when the emetic has done its duty, diluent drinks and vegetable acids may be given. Cold water poured on the head is of service, and I have heard that it is beneficial to inhale dilute ammonia. Water Hemlock smells like celery when its leaves are bruised; it is very poisonous. The treatment is the same as above.—*H. E. Watney.*

Stratiotes (page 45).—I am afraid that neither "J. S." nor "any other man" will discover the "Water Soldier" on Wandsworth Common any more. The largest pond on the common, formerly a favourite resort of Gyrini and other aquatic insects, and popularly known as the "Black Sea," has been filled up. Several of the smaller and shallower ponds have also disappeared. It is not very long, however, since I saw some plants growing in a narrow streamlet on Wimbledon Common, not very far from Combe Wood, and, in all probability, it will be found there now in some of the ponds and ditches, the recent weather having been much in its favour.—*J. R. S. C.*

Rearing Young Dormice (page 47).—I have no doubt it is the case with some of the dormice, as with the more commonly kept white mice, that there are mothers which in confinement will habitually devour their young in spite of every precaution. Most who have kept the latter animals have found also that the presence of the male seems to excite the female in some instances to destroy her progeny, which may also be the case with the dormouse. And it must be remembered that the female may be easily alarmed in other ways besides disturbing her nest, and a loud noise will cause her to attack her young by rendering her apprehensive regarding their safety; nor should she be approached too frequently just at the crisis. It is rarely, I think, that hunger leads to this catastrophe; it is, as with cats and swine, a morbid bias given to the parental emotion.—*J. R. S. C.*

Larva of Arctia Caja.—Your correspondent Claude Ryan observes that he has never found larvæ of *Arctia Caja* until the middle of April, and then quite small. This year I found two or three specimens as early as the first week in March, and they had apparently been feeding some little time, as they were three-quarters of an inch in length, and looked more glossy than they usually do just after leaving their winter quarters.—*E. Lovett.*

Herald Moth.—On the evening of the 26th of March I caught a fine specimen of this beautiful moth on the wing, in a flower-garden close by the dwelling-house. Mr. Newman says, "August and September are the time for their appearance, but they are fond of hybernating through the winter in lofts, toolhouses, &c.," where I have often found them all the year round, yet never caught one on the wing before. Is this not rather a rare occurrence at this time of the year?—*Arthur Smyth.*

Occurrence of the Camberwell Beauty.—There is no doubt, I think, that, altogether, the last has been the worst season for the entomologist which has occurred since 1860; and, as has been noticed before in such years, at a time of general scarcity, some conspicuous rarities turn up. That choice butterfly named above (*V. Antiopa*) has been seen and captured at different places, widely separated from each other. At Shirley, on August 25th, a number were seen on the wing. This occurrence is singular, as the locality is not very many miles distant from the district whence the species got its name years ago, when it appeared so plentifully as to be also called the "Grand Surprise." How it is that a rare butterfly suddenly appears in this way is still a mystery. We can hardly suppose that these individuals have crossed the Channel, nor is it likely they could have been liberated from imported pupæ.—*J. R. S. C.*

Parasites on Cage Birds (p. 213, last vol.).—I suspect not much can be done in the way of remedy applied to the bird itself. I was recommended to try Dumont's Insecticide, and blow this with the bellows upon the parts attacked; but in this case the bird (a goldfinch) died the next day; which was not a promising fact for further experiments. A larger bird might, it is possible, be operated upon successfully. These ticks, mostly of the genus *Acarus*, breed in the woodwork of cages, and must be there sought out and destroyed. In other cases, as perhaps with the starling mentioned, these creatures are nurtured in seeds, or other food, and thence transfer themselves to the birds.—*J. R. S. C.*

THE CAPTURE OF THE CAMBERWELL BEAUTY.—No sooner does some choice butterfly show itself in exceptional abundance than entomologists are at work everywhere, eager to net it, and the natural consequence is that for some years, at any rate, an effectual check is put upon its multiplication. This is short-sighted policy; though the desire of adding a rarity to the cabinet is too strong a temptation to many. It is rather fortunate that *V. Antiopa* has a better chance of escaping than some species, being strong-winged and wiry; yet, for all that, I observe that the *Entomologist* of October records the capture of between 130 and 140 specimens throughout England and Scotland. Surely the time will come when some of us "Conservatives" will have to combine and form a "Butterfly Protection Society" for the preservation of scarce and local insects.—*J. R. S. C.*

THE GLASGOW SOCIETY OF FIELD NATURALISTS.—The annual meeting of this society was held on the evening of the 18th of March, Mr. J. Allan, vice-president, in the chair. During the past year the branches to which the members have chiefly directed their attention have been Entomology, Botany, and Marine Zoology. A summary of the work done showed that twelve excursions had been held by the society, and that eleven different localities had been visited by individual members; so that the minutes contain notes on the natural history of twenty-three different localities. It also showed that sixteen papers had been read by the members; some of these papers being compilations from authors on the subjects of which they treated, aiming at bringing before the members as much information as possible in a condensed form. But many of the papers were written from original observation; thus tending to add to the stock of knowledge of the subjects on which they treated.

ASH-TREES.—Can any of your readers inform me why some old ash-trees are hollow, or decayed in the middle, and others perfectly sound? There have been several fine ash-trees cut down this season, two of which I took particular notice of, from their great size; No. 1 being 3 feet 6 inches in diameter, perfectly sound externally, yet so decayed as to be useless; No. 2, 4 feet 6 inches in diameter, hard and solid all through.—*Arthur Smyth.*

GUM-DAMAR.—On your Correspondence page, March, 1872, you give a receipt for making gum-damar. I have tried, but cannot dissolve the gum in turpentine. I have some which has now been in turpentine for more than a month, and it has simply formed an amorphous mass at bottom of the bottle. Nor can I succeed in dissolving it in benzoline. I shall esteem it a favour if any of your readers can assist me.—*Alfred Allen.*

THE OLDEST TREE.—In answer to "C. H. R.'s" question, yew-trees are considered to be the oldest of all European trees. I understand there is one at Braburn, in Kent, to which De Candolle assigns an antiquity of thirty centuries; but its age is conjectural on its great size. There is another in Darley churchyard, Derbyshire, which is calculated to be 2,006 years old. The "Cowthorpe Oak," near Wetherby, in Yorkshire, is stated by Professor Burnet to be 1,600 years old, and so large is its hollow as to contain within it 70 persons at one time; while a book which I have by me positively states that the "Parliament Oak," 1,500 years old, is the oldest tree in England. It is situated in Chipstone Park, belonging to the Duke of Portland, and is so called from a tradition of Edward I. holding a parliament under its branches.—*F. M. S.*

POISONOUS PLANTS.—Can any of the readers of SCIENCE-GOSSIP tell the botanical name of the plant eaten by the two children belonging to the Chester Workhouse some little time ago? Both the children were poisoned by eating the root of some plant: the account appeared in the papers, but the name of the plant, I believe, was not stated, at least not correctly so. The *Wild Carrot*, I heard, was named, but the root of that is not *poisonous.—Eliz. Edwards.*

DO FISHES MOVE AFTER DEATH?—On the 28th of January I found near the pier, in a small pool left by the tide, a fine goby. I took it home in a can of water and placed it in a dish by itself, feeding it occasionally with small pieces of raw meat. About four days ago I removed it to a pan-mug with a dahlia wartlet (*Bunodes crassicornis*). Yesterday morning (about half-past seven), the 11th of February, I went to look at them, and found the fish on its back, apparently dead. I took it out of the water and carried it downstairs in my hand, then took it up again and laid it upon a book-shelf until I could stuff it. About four hours after I went upstairs to look at it, and was surprised to find it gasping. I put it quickly in the water, and it slowly opened and shut its gills and moved its tail: this movement continued for about two or three minutes, and at last ceased.—*D. H. T.*

OLD TREES.—I see in the the SCIENCE-GOSSIP for this month a question is asked by "C. H. R." as to which is the oldest tree in Great Britain. The oldest one I ever heard of is a yew-tree in the churchyard of Darley Dale, in Derbyshire, about three miles from Matlock. Both the inhabitants and the guide-books to the neighbourhood will tell you it is the oldest tree in England. Its age is calculated to be 2,006 years. It is of enormous girth, but not very tall. The inhabitants of Darley are very proud of their tree, and it is considered one of the sights of the neighbourhood.—*G. S. E. G.*

DIALECTS OF BIRDS.—A naturalist living at Lofthouse, in Yorkshire, in some rural notes contributed to the *Yorkshire Post*, remarks on the difference of the notes of birds in different districts. He says: "The call-note of the Chaffinch in the Swiss mountains is materially altered by locality—so much so as to deceive ears well accustomed to it in England. In his *Gleanings of Natural History*, Mr. Jesse has some remarks on what he terms the 'dialects of birds.' I have noticed that birds have different tones in different districts. Sterne says that Welsh dogs 'bark with a brogue.' A thrush, which sang several weeks in a plantation near this village, had a voice and a manner of singing quite different from the voice and manner of ordinary thrushes. Besides the difference in voice and tune, it would often interrupt itself, and give a peculiar bubble or roll in its song. At first I mistook this bubbling note, being so strong and mellow, for the note of a much larger bird. I find that some thrushes' songs, like the Cuckoo's described by Wordsworth, sound 'as loud far off as near.'"—*J. E. N., Manchester.*

NOTICES TO CORRESPONDENTS.

A. SHAW.—The bones sent are known as Otolites, or the ear-bones of the Cod. You will find a detailed account of their nature and economy in Cuvier's "Animal Kingdom," vol. ii. p. 344. Their structure much resembles that of shells, especially of some of the opercula. You may find them in the ears of most fishes.

WM. MORLEY.—The flower more nearly resembles *Linaria repens* than *L. pelesseriana*; but it is very difficult to identify species from a single flower. The entire plant should be sent.

F. W. S.—Your fossil corals belong to the same species, *Lithostrotion irregulare*, one of the most characteristic fossils of the Carboniferous Limestone formation.

J. C. M.—Our thanks are due for the fine specimens of *Isoetes hystrix*, which reached us in capital condition.

A. L.—Your specimen was an undeveloped *Jungermannia*.

W. L. N.—You had better write to the publishers, complaining of the delay. We have already called attention to it, and do not see what we can do further.

D. H.—The Toothwort (*Lathrea squamaria*) is usually parasitic on roots, and we have never known it to occur otherwise. We know the locality you mention (Marple Wood), and should think it grows there over decaying roots.

H. W. P. R.—The best way of fastening your plants down is, we think, by strips of paper. See note on this subject in last number of GOSSIP. You will find a full account of how to preserve fungi in an article on "Collecting and Preserving Fungi," by Mr. Worthington Smith, in the September number of SCIENCE-GOSSIP, 1872.

J. W. S.—A book on Marine Aquaria is much wanted. You will find some information on the subject in the Guide to the Crystal Palace Aquarium. You may get to know how to make artificial sea-water in the instructions given with the bags of sea-salt sold for baths, by any good chemist.

C. L. A.—The monstrosity in the pistil of Dutch Hyacinth sent us is what Dr. Masters has explained in his work on "Vegetable Teratology," under the heading of "Pistillody." See chapter bearing this title.

F. I. D.—Get Dr. Lankester's "Half-Hours with the Microscope" (London: Hardwicke), and Davies on "Mounting" (same publisher). These books are both cheap, and their study will help you to all the information you require.

T. F.—We are sorry we cannot help you to the information you seek. We have applied to several microscopists, with the same result. We will insert it as a query next month, and see if it will bring a reply.

M. J. G.—Will this correspondent, whose mosses were mentioned in the February number, be good enough to communicate with us?

A SUBSCRIBER.—The best thing you could get for mounting your shells on would be common millboard, about the sixteenth of an inch thick. It is seldom kept in stock, but any stationer would know what you mean, and get it for you. Use the "Coaguline," or "Derby" cement, for fastening the shells. It is semi-transparent, and doesn't show, and the slightest drop is sufficient. This you may order through any chemist.

F. W.—The mosses sent are—1. An *Orthotrichum*, not determinable without ripe fruit; 2. *Hypnum lutescens* and *H. confertum*; 3. *Pottia pusilla*; and 4. *Rhacomitrium lanuginosum*.—*R. B.*

A. SMYTH.—Your moths arrived so smashed that they formed an entomological puzzle! We could only see by the fragments they were all common species, but it was impossible to assign them to the numbers. Hübner's book is very rare and expensive, but you may perhaps meet with it in some great public library. Stephen's is more common, and may be met with in a similar place. Get Rev. J. C. Wood's "Insects at Home," just published.

J. M. D. ASHBURY.—Many thanks for the slides. That of the nervous system of the Cockroach (*Blatta*) is excellent, and worthy of the highest praise for the pains and skill displayed. It is a valuable and interesting object, and we recommend students to experiment on the internal structure of similar objects.

REV. J. D. LA T.—Your article is in type, but we have been unwillingly obliged to defer it till our next issue.

W. B.—Your specimen is the elongated Polysiphonia (*Polysiphonia elongata*), a not uncommon sea-weed.

J. CROWE.—Not congealed water at all, although it is commonly called so. The crystals are those of selenite, or sulphate of lime; common in the London clay.

T. B. A.—The rock specimen is chiefly composed of the stems of an Encrinite (*Poteriocrinus crassus*), one of the commonest of the carboniferous fossils.

EXCHANGES.

DIATOMACEÆ.—*Orthosira arenaria* well mounted (opaque) for fossil Diatomaceous Material, Sea Soundings, Shell Cleanings or Guanos.—R. Ruttray, 30, Balfour-street, Dundee.

GOOD Slides for the same or for material. Send lists.—C. L. Watchurst, 13, Denbigh-terrace, Fairfield-road, Bow, London.

SCALES of Fern, *Nothochlæna lævis* (a beautiful slide for the polariscope), for any other well-mounted object.—J. Ford, Stamford.

WANTED, Geological Slides, Diatoms and other good Slides.—R. H. Philip, Anlaby-road, Hull.

WANTED, Diatomaceous Earths, chiefly Springfield, Barbadoes, Nottingham, and Yarra, for well-mounted slides.—Send list to H. B. Thomas, Boston, Lincolnshire.

PUPÆ of *C. Elpenor*, for other pupæ. Answer by return if accepted.—Alfred Pickard, Wolsingham, Darlington.

EGGS.—The Little Auk, Stint, Grouse, Widgeon, Harlequin Duck, Golden Eye, and several others, for rare eggs not in collection. Post Cards not attended to.—J. T. T. Reed, Ryhope, near Sunderland.

GOOD Slides for Mole Crickets, large Green Grasshopper, Great Cockroach, or Stag Beetles.—C. L. Jackson, 11, Heskett-street, Southport.

A VARIETY of Microscopic Slides.—Send list for list, to Alfred Allen, Felstead, Essex.

WANTED, Copy of "Quekett on the Microscope," for his "Lectures on Histology," 2 vols. in 1; good order.—Address, Rev. W. Eyre, Northchurch, Great Berkhhampstead.

Gamasus Coleoptratarum, parasite of *Geotrupes stercorarius*, mounted in balsam, for any good mounted object.—E. Lovett, Holly Mount, Croydon.

DIATOM.—*Achnanthidium lanceolatum* mounted, for other good mounted objects.—John C. Hutcheson, 8, Lansdowne-crescent, Glasgow.

WANTED, Good Microscopical Slides (Diatoms and Seeds excepted) for foreign Snakes, Chameleons, &c., well preserved in spirits.—Send list to Theo. Lane, Broomy-hill, Hereford.

SECTIONS of Teeth and of Bone, well mounted, for other well-mounted objects. Diatoms preferred. Send list.—W. Nash, Stroud, Gloucestershire.

WANTED, Fossils from the Pipe-clay beds of the Lower Bagshot Sands, Bournemouth, for other Fossils, British land and fluviatile Shells, or Lepidoptera.—Address, M. M., Post-office, Faversham, Kent.

BRITISH SHELLS wanted for Minerals, Fossils, or Foreign Shells.—N., 20, Maryland-road, Harrow-road, London, W.

BOMBYX MORI.—Mulberry Silkworm Eggs; any one requiring a few may have the same on receipt of stamped envelope and quill.—Thos. Pickin, Mount-fields, Shrewsbury.

CHALK FOSSILS from Charlton and Fossils from the Woolwich Plastic Clay, for Oolitic or Silurian Fossils.—W. G. Freeman, 165, Maxey-road, Plumstead.

BRITISH SHELLS (good), for good specimens of British and European *Defrancias* and *Pleurotomas* (*Mangelias*).—Mr. M., Foxley Villa, Foxley-road, North Brixton, London, S.W.

Catocala sponsa.—*Desiderata*: Saturnia pavonia-minor, Cossus ligniperda, Smerinthus tiliæ, Chærocampa elpenor, Arctia villica, or offers.—H. Tomlinson, East-street, Maidenhead, Berks.

BOOKS RECEIVED.

"Monthly Microscopical Journal." April.
"Boston Journal of Chemistry." March.
"The Feræ Naturæ of the British Islands." By John Colquhoun. London & Edinburgh: W. Blackwood & Sons.
"Journal of Applied Science." April.
"Les Mondes."
"The Canadian Entomologist." Vol. v. No. 2.
"The Canadian Naturalist." Vol. vii. No. 1.
"The Sanitarian." No. I.
"Popular Science Review." April.

COMMUNICATIONS RECEIVED UP TO 14TH ULT.—W. G.—H. W. P. R.—T. B. B.—T. B. W.—J. B.—J. F.B.—C. L. W.—W. C.—C. S.—H. E. W.—M. A. H.—W. H. B.—F. W. S.—A. S.—J. H. E.—W. S. P.—T. B. W.—W. H. W.—H. B. T.—J. G. R. P.—G. J. L.—W. H. S.—W. L. N.—D H.—R. H. P.—H. P. M.—W. H. S.—C. A. L.—J. C. M.—H. U.—J. P.—G W.—F. T. D.—J. T. T. R.—A. P.—F. W. M.—H. E. W.—W. S.—J. B.—A. A.—E. E.—W. L. W. E.—F. M. S.—C. L. J.—F. G. M.—A. S.—E. L.—T. L.—C. F. W.—J. C. H.—A. G. W.—W. M. B.—A. H.—G. T. J.—W.B. H. —H. A F.—H. S.—C. R.—H. G.—W. W.—J. M. D. A.—C. O. G. N.—E. B. F.—R. H. N. B.—R. F. T.—W. N.—J. B.—J. E. R.—J. L. M.—J. C. S.—W. G. F.—H. T.—T. P.—J. H. N., &c.

SCENERY OF THE LAKE DISTRICT GEOLOGICALLY CONSIDERED.

By J. CLIFTON WARD, F.G.S.

(Of Her Majesty's Geological Survey.)

THE origin and growth of the love of fine scenery is an exceedingly interesting and curious study. Living, as we do, in an age when all classes more or less appreciate the picturesque, it is difficult for us to conceive that a time existed when the grand and beautiful in nature awoke but an occasional response in the mind of even educated men. Yet is it a matter of history that, little more than a century ago, those very scenes which now yearly call forth the admiration of thousands of tourists, were branded by men of cultivation and intellect as gloomy, hideous, and horrible.

Macaulay tells us that Captain Burt, about the year 1730, was one of the first Englishmen who caught a glimpse of Highland scenery, and he speaks of the mountains thus:—"Their deformity, he said, was such that the most sterile plains seemed lovely by comparison. Fine weather, he complained, only made bad worse; for the clearer the day, the more disagreeably did those misshapen masses of gloomy brown and dirty purple affect the eye. What a contrast, he exclaimed, between these horrible prospects and the beauties of Richmond Hill!" How are we astonished also when we find that even such a man as Oliver Goldsmith, when exploring the Highlands more than a century ago, failed to recognize their beauty. Macaulay says: "He was disgusted by the hideous wilderness, and declared that he greatly preferred the charming country round Leyden, the vast expanse of verdant meadow, and the villas with their statues and grottos, trim flower-beds, and rectilinear avenues."

An ardent angler who skirted the Highland district writes thus of it in 1694:—"It is a part of the creation left undressed; rubbish thrown aside when the magnificent fabric of the world was created; as void of form as the natives are indigent of morals and good manners." If such were the feelings of observant minds a century or two ago, with regard to what is generally recognized as the finest scenery in the United Kingdom, it may be almost taken for granted that our English Lake district could not have been much appreciated. How little this district was then frequented, may be gathered from one of the poet Gray's letters, dated October, 1767. Speaking of the hamlet of Grange, at the entrance to Borrowdale, he says:—"The dale opens about four miles higher till you come to Sea-whaite; all farther access is here barred to prying mortals, only there is a little path winding over the fells, and for some weeks in the year passable to the dalesmen; but the mountains know well that these innocent people will not reveal the mysteries of their ancient kingdom, 'the reign of Chaos and Old Night:' only I learned that this dreadful road, dividing again, leads one branch to Ravenglas, and the other to Hawkshead."

Another traveller, in the year 1772, speaks of a part of Borrowdale thus:—"This valley, so replete with hideous grandeur, is known by the name of the 'Straits of Borrowdale,' while Derwentwater

is described as 'Beauty lying in the lap of Horrour'!"

We have now to unravel some of the mysteries of this district, to seek among "that turbulent chaos of mountain," as Gray speaks of it, for some laws of order and of harmony.

Who amongst us can look thoughtfully upon the beautiful scenery of the Lake district without being led to ask innumerable questions as to its cause, why here the mountains should be rugged, there smooth; here craggy, and there gently sloping? Why in some places there should be flat plains, in others gently rolling hills, and in others precipitous mountains? When, too, was this effect produced? Were all the types of scenery formed at once by the "I will" of the All-powerful, or were they elaborated gradually in the great workshop of Nature by the action of those laws ordained by the great First Cause?

If the latter be the case, our minds immediately ask, What were these laws? Are they still in operation? And if so, can we, by noting their working now, form some idea of their working in ages past? Surely there is abundance of matter for thought here; let us meet Nature gladly, question her fully, accept her answers frankly, and we must of necessity become both wiser and happier.

What then is the first question we should address to Nature in our endeavour to find out the causes of the varied scenery? Clearly this: *Is the rocky material forming the varied types of scenery the same?*

The low swelling hills which for the most part encircle the mountain-district, are made up of alternations of limestone and sandstone, with a gentle dip away from the inclosed higher ground, the strata being of somewhat varying hardness, and but little disturbed or contorted.

The lofty, massive, but *smooth* Skiddaw consists of dark clay-slate, old mud-deposits hardened, cleaved, and contorted, shivering into flaky fragments. The still more lofty Scawfell, all *craggy*, precipitous, and stony, presents us with another kind of rock; a close, altered, stratified volcanic ash, breaking into blocks by reason of the numberless joints traversing it, and strewing the ground below with broken angular fragments.

Go over into Eskdale and mark the heathery and rounded hills around Stony Tarn, and north of the river Esk; here we find granite crumbling at the surface, and giving rise to a gritty quartzose soil.

Pass back to that mysterious conical hill, Mell Fell, north of Ullswater, standing like a sentinel at the outposts of the mountains, with a height of 1,760 feet, and not a trace of crag or cliff upon its sides. What have we here? Conglomerate, a shingly deposit, mostly loose and ready to slip away when the grassy covering is removed.

Those small grassy plains, nestling among the mountains, and found at the head of so many of our lakes; these are formed of soft river-mud and loose sand and gravel evenly spread out. *Thus we find each different type of scenery associated for the most part with a different kind of rocky material.*

The next question we must ask is, *What are the agents which produce scenery as a whole?*

The only possible agents are, 1. The denuding action of the sea along coast-lines. 2. The denuding power of the various atmospheric agencies; viz., the chemical action of the air and running water, and the mechanical action of the air, running water, and frost. 3. The violent upheaval and disruption of the rocky matter by an action from below. To which of these agents are we to ascribe the production of scenery in general? or have they all taken part in the work?

It is not here necessary to enter into discussion of the first principles of geological science, and therefore I shall say no more upon this part of my subject than is necessary for the logical completeness of the whole.

It is well known that the sea denudes *chiefly* along the coast-line, acting like a great planing machine, and tending to form what Prof. Ramsay has called a "plain of marine denudation;" and if this be so, it is clear we cannot look to it as the agent producing scenic detail, though we may regard it as the great worker which has rough-hewn a block of earth to be afterwards moulded and carved by other agents.

The other agents to which the scenic tracery of nature is due, are chiefly the various atmospheric powers as enumerated above. But few geologists who have practically worked in the field, now believe in the agency of violent cataclysms; deep valleys and ravines are not generally produced by gaping fissures and wide rents, but by the slow action of causes we now see in operation—the chemical and mechanical action of the atmosphere.

Let us think but for a few moments of what we must all have noticed of this action in a mountainous district or elsewhere.

Look at a mass of greenstone; its exterior is weathered brown, and has become soft and crumbling; chemical decomposition has taken place, and its stained outside effervesces briskly when touched with acids. Examine limestone crags; see how honeycombed they are, how moulded into fantastic shapes, how eaten out into hollows and depressions: the carbonated rain-water is the solvent power. Take, again, the case of sandstone and grit rocks; see how much they are often weathered by the atmosphere. The amount of weathering depends much upon the material that cements the particles of silica together; if this be calcareous, the rain-water readily dissolves it, and then the sandy particles fall away; but if the cement be siliceous,

the stone resists disintegration to a greater extent.

Last summer I was wandering one day beneath the red sandstone cliffs along the coast of Fife. Their base now stands some 20 feet above high-water mark, but in former times the sea has formed large caverns in them. Above these caverns and around their outer sides the rock is eaten away along the lines of bedding into those hour-glass-shaped tiny columns, so characteristic of weathered sandstones. I had been accustomed to regard similarly weathered rocks far inland—such as those of West Heath, in Sussex—as produced by atmospheric agency, but here the thought would suggest itself, whether, after all, such was not the result of old sea-action. In the evening, however, I took my walk along the cliff-top, and came upon the so-called Macduff's Castle, built of the same sandstone as that forming the cliffs, and now in ruins. Any lingering suspicions as to the power of the atmosphere to honeycomb the cliffs below, were at once dispelled, for some of the stones of the castle were almost entirely eaten away, and all of them honeycombed to a greater or less extent, all this weathering having been effected within the lapse of a few hundred years.

But perhaps some will say, what has all this to do with the formation of scenery? Much every way; this atmospheric decomposition and disintegration of rocks is the fundamental fact of denudation, and renders possible the more evident and powerful mechanical action of running water, wind, and frost.

This mechanical action, too, will be sufficiently recognized by most of us. Many, if not all of us, have visited some mountainous district where the power of running water is seen in its full force. We have traced the tiny stream from its bubbling fountain-head high up on the mountain downwards to broad valleys and open plains; we have marked every gradation from the little channel in which the brooklet runs, down to the wide valley with its rushing river; we have watched the impetuous waters ever wearing away the valley sides, and side streams joining the main one, each issuing from its own self-made glen. We must have noticed those heaps of stones formed where small valleys open out into wider ones, more or less conical hills of *débris* brought down in winter's floods by streams oftentimes dry throughout the summer. I am convinced that no one with his reasoning powers about him can see all this without being led to the conclusion that the valleys have been carved out and the hills sculptured by those very agents we see now at work. The upper end of every lake is more or less filled up by the mud, sand, and stones rolled down from the mountains around, and the sides of every valley are covered with fallen *débris*. The chemical action of the air and rain-water is disintegrating and dissolving away the rocks, the freezing of the water among their crevices is yearly shattering them, and the heavy rainfall and flowing water is for ever bearing away the loosened material to lower and lower levels.

There is yet another atmospheric agent which has acted powerfully in this country at a recent date, and may now be studied in operation in Switzerland. I allude to ice in the form of glaciers. We must not enter into this subject into detail, it is too vast; but those who have travelled among the Alps will know something of its mode of action. Suffice it to say that a glacier is a river of ice, representing the snow-drainage of the mountains, only flowing very much more slowly than an ordinary river; that the frost is constantly detaching blocks of stone from the snowless peaks and crags on either side of its course, which fall upon the ice; that these blocks are carried onwards with the glacier, forming long lines upon its surface, and where it ends they are shot off and produce mounds of stony rubbish, called terminal moraines. Not only this, for as the ice moves slowly over its rocky bed, it, aided by imprisoned stones, smooths, grinds, polishes, and scratches it, rounding the rocks in a very marked manner, and often leaving large blocks of stone perched upon them. Thus is glacier-ice a very powerful agent of denudation; the rocky fragments it bears from higher to lower levels are innumerable, and since powerful streams flow from the ends of glaciers, fully charged with sediment—the grindings of the rocks—much that is brought down by the ice is carried onwards by the running water to fill up lakes and hollows in the valleys, or to be carried finally out to sea.

The whole of our English Lake district has been thus ice-worn. In every valley you may mark the rounded and scratched rocks and the old moraines left by the retiring glaciers.

But the person who has received no geological training will argue—these atmospheric agencies you have been enumerating are indeed effectual in doing a certain amount of work, but surely they seem quite inadequate to produce the great results you ascribe to them; the mountains and valleys change not in form or shape. Has not the poet spoken of the "everlasting hills"? and am I to believe that each mountain has been, in the main, separated from its fellow by the action of the falling rain and flowing stream? To such a one I would answer, the greatest ends of nature are worked out by simplest means; insignificant agents working immense periods may produce a result equal to that effected by very powerful agents acting through a short period. Picture to yourselves such action as we have been speaking of, carried on through untold past ages, time unthinkable, and need we wonder that all these beautiful valleys and rock-bound glens have been thus formed? To the length of

time, during which the various atmospheric agencies have worked in producing the scenery of the district is question, we shall presently return, but I think we may fairly conclude that our second question has been answered thus:—*Atmospheric agencies may produce our scenery as a whole, given sufficient time.* If this be so, we are led to inquire in the next place, *How far the effect of these agencies is varied by the peculiarities of the rocks in structure and composition?* We have already seen that in a general way different kinds of rock are associated with different kinds of scenery, and we now wish to examine more minutely into the scenery, and to observe the causes, not only of the general style of architecture, but of the varied carving and ornamentation.

We will commence our study round what I cannot but consider as the gem of the English Lakes, Derwentwater. We stand at the end of Friar's Crag, that rocky promontory jutting out into the lake. Before us are spread the glistening waters, with here and there a well-wooded isle. Due south is the entrance to Borrowdale, at the head of the lake. On our left—the east side of the lake—are the steep craggy mountains forming Wullow and Falcon Crags, and the rocky precipices about Lowdore and as far as Grange. On our right—the west side of the lake—are the generally smooth grassy mountains of Swinside and Cat Bells, and many others of similar nature on either side of and beyond the beautiful inverted arch of Newland's Vale. Nothing could be more distinct than the mountain-forms on either side the lake; on the one hand all is rough and craggy and the outline rugged, on the other all is smooth and sloping and the outline soft. And why is this? The cause is not far to seek. On the east side of the lake the mountains are formed of hard volcanic rocks, which are constantly being shattered by the weather and fall away in large blocks, sometimes of great size, strewing the ground below. Numerous irregular joints and fissures assist in the work, and hence the craggy hill-sides. On the west side, however, the material is very different, the mountains are formed of Skiddaw slate, which instead of breaking away in large fragments, shivers into small scales or pencil-like pieces. The waste of these hills is not found upon their slopes or at their base in the form of large blocks like those of a ruined castle, but in that of a fine clayey and shaly wash of comminuted slate. We see at once that the atmospheric agencies are at work lowering the mountains on either side, but the same agents working on different materials produce a very different result.

But now, having mastered the general features of this view, let us, as we in imagination walk round the lake, note some of the minutiæ of the scene. And first let us observe our standpoint, Friar's Crag, and the round craggy and wooded hills of Cockshot and Castle Head. These are all formed of greenstone intruded among the Skiddaw slates; the latter are soft, the former is hard; hence the craggy prominences; and Friar's Crag owes its special character, as the horn of a small bay, to narrow greenstone dykes among the softer slates.

Next I wish you to observe that the line of junction between the soft Skiddaw slates and the hard volcanic series runs along the eastern edge of the lake, and that that line is a faulted one. The hollow in which the lake lies has been scooped out of the softer rocks. Now carry your eye along the craggy line of mountains rising above and behind Barrow House. Here there are many alternations of stratified ash-beds and lava-flows, all dipping slightly into the hill at a low angle. The consequence of this is that a step-like form is given to much of the upper part of this hill-side, some of the beds being harder than others, and more or less standing out in relief, and from the opposite side of the lake especially these parallel lines of strike form a very conspicuous feature.

Walking southwards from Barrow House, one is much struck with the great quantity of material fallen from the steep rocky cliffs, and the large size of some of the masses, all, it would seem probable, brought down by weathering since the close of the glacial period. Behind the Borrowdale Hotel is the beautiful comb of Frontdale, a patch of grassy and cultivated land running up among the craggy mountains. Examination shows that the bottom of the comb is formed by the soft Skiddaw slates, and the sides by the hard volcanic rocks. Upon the other side of the road lies the alluvial land at the head of Derwentwater, representing a part of the lake filled up by the matter rolled down into it by the river Derwent and the Lowdore stream. Soundings taken in the lake show how this filling-up is still going on, for a long stretch of shallow water, from six to nineteen feet, runs from the present mouth of the Derwent full three-quarters of a mile out into the lake, having deeper channels on either side.

Arrived at the picturesque village of Grange, we reach the southern limit of the Skiddaw slates, and on entering Borrowdale have around us on all sides rough wild craggy mountains with strangely hummocky outline, formed of cleaved volcanic ash and breccia, with occasional beds of contemporaneous trap. The bedding of the ash is often very evident, as along the face of Gate Crags (fig. 75) and on many smaller rock exposures, the prevailing dip being S.S.E. at from 25° to 30°. The planes of cleavage crossing this dip at a higher angle oftentimes strike the observant eye very forcibly, while in some places the frequent joint planes give occasionally somewhat of a columnar appearance even to the well-bedded ashes. But, perhaps, the most

striking feature in the scenery about the entrance of Borrowdale is the ice-worn appearance of the rocks. On every hand there rolls a sea of *roches montonnées*. Such may be observed upon the Skiddaw slate area at and south of Grange, the well-known example at Grange Bridge specially demanding attention, on account of the elongated form of the ice-smoothed mass and the fine preservation of the scratches. But here I would observe that the Skiddaw slates *generally* retain less of the effects of ice than the ash and trap rocks, although perhaps some of the best smoothed and best scratched surfaces are to be found upon the former rocks. In Borrowdale, however, almost every surface of rock is more or less rounded, and in many cases the ice has worked up the dip-slopes of the various beds (see the low and sloping crag in the centre of fig. 75. Would one see the hummocky nature of ice-worn ground to perfection, the summit of Brund Fell, upon the east side of the road through Borrowdale, should be walked over. Every rock is a rounded surface, and almost every surface is very deeply grooved and scratched in one definite direction, while every here and there are fine examples of perched blocks. At present we must

Fig. 75. Castle and Gate Crags, Borrowdale.

not enter further into Borrowdale; but ere we turn we cannot but notice the oval patch of alluvial land marking the sight of an old lake just below Bosthwaite, and another similar stretch of flat land below Seathwaite, indicating a second lake now filled up by stream-borne detritus.

On returning, along the western side of the lake, we may first notice, above and west of Grange, the line of crags running up to Castle Nook on the hill summit, at the base of which a fault runs, throwing up the Skiddaw slate: here is clearly marked the change of feature on passing from soft to hard rocks. Walking northwards, along the flanks of Maiden Moor and Cat Bells (all Skiddaw slate), we meet with many long grassy slopes, a few slightly craggy spots, where occasional harder beds or quartz strings occur, and several streams of stones made up of small slaty fragments. About Manesty Farm some very fine examples of ice-worn and scratched surfaces occur, and perched blocks from Borrowdale are frequent, even to the summit of Cat Bells.

A very striking view up Borrowdale is gained a little above Manesty. The site of old Bosthwaite Lake is seen through an inverted arch formed by the sides of Brund Fell and Castle Crag, between which flows the Derwent (fig. 76); but I wish you particularly to note the rough and uneven sides of this arch, formed by rocks of the volcanic series, in order to compare them with the sides of a similar inverted arch among Skiddaw slate rocks, which we shall presently notice.

Fig. 76. Borrowdale.

At the northern end of Cat Bells the way in which the smooth sides are mostly formed is well seen; for here the slate is found weathering into squared, pencil-like pieces, and at the base of the hill the slaty washings lie.

Between Derwent Bay and Rosetrees some craggy pieces may be found among the woods, formed by intrusive greenstone.

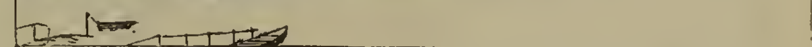

Fig. 77. View across Derwentwater to Newland's Arch.

Crossing the lake and taking our stand at the boat-landings, we may look south-westwards across the water and note the inverted arch of Newland's Vale, formed by the flanks of Cat Bells and of Cansey Pike (fig. 77). This arch is one of singular beauty and softness; its span is wide, its sides symmetrical and perfectly smooth, and the round mass of Robinson, with the lofty Buttermere mountains, appear to great advantage beyond, set in this exquisite framework. The Borrowdale arch we just noticed is rough and uneven, because the rocks are hard and weather craggy; the Newland's arch is smooth and even, because the Skiddaw

slate weathers away in small pieces and flakes. All those too who have gone from Keswick to Buttermere by Honister Pass, returning by Newland's Vale, will have contrasted the rugged cliffy mountain-sides of Borrowdale with the smooth green sloping hill-sides seen on ascending the Newland's Pass (fig. 78).

Fig. 78. View on ascending the Newland's Pass from Buttermere.

Although smoothness of outline is the general character of the Skiddaw slate mountains, yet do we find occasional exceptions to this, arising from special circumstances. Thus, when the slate contains harder sandy beds, these stand out more or less in relief and give rise to bolder cliff-like parts. Again, the masses of eruptive greenstone frequent among the Skiddaw slate series, also often modify the otherwise smooth scenery; on the east side of Hindscarth is a long patch of greenstone which forms a very craggy side to the mountain, this rock being harder than the slate and falling away in blocks.

The relative direction and amount of the true dip and the cleavage dip of the slate frequently affects the form of the mountain. To this is due, in great measure I believe, the shape of Blencathra (Saddleback); the gentle slope to the north, at the back of the mountain, corresponding in direction and inclination with the bedding dip, and the fine ravines upon the south-east side being produced by the weathering along the steeper cleavage dip. One flank of the southern part of Hindscarth corresponds with the strike of the cleavage-planes of the slate, and a steep glacis is consequently formed at an angle of about 50°, corresponding to the dip of the cleavage. Close to this also, between Hindscarth and Dale Head, a stream has cut out a very deep narrow ravine along the line of the cleavage. Many of the narrow edges often found to unite mountain with mountain or to run off from a main ridge, are in great part formed by the easy weathering of the slate along the cleavage-planes.

If now we glance at the rocks of the volcanic series, we find among the mountains of Borrowdale all the variety of rugged and craggy aspect due to hard rocks, but yet rocks of various degrees of hardness. When standing on Stye Head Pass one can see at once the connection between the grandly rude step-like form of the Scawfell range, and the inclination of the massive stratified beds of altered ash forming it, dipping at an angle of 25° in a S.S.E. direction, and traversed by numerous joints and dykes more or less at right angles.

Where there occurs a great thickness of ash of *nearly uniform hardness* and well cleaved, the form of ground oftentimes more nearly approaches that of the Skiddaw slates; thus, along part of the summit of the Helvellyn range is such a thickness of ash much cleaved, and the form is rather that of Blencathra in both its phases.

The Vale of St. John is a striking instance of the dependence of mountain-form upon geological structure. Standing at its lower end and looking up the valley, there is seen on the left a long range of precipitous mountains with evident lines of bedding running along its face, the strata of hardened ash dipping steadily into the hill-side at from 8° to 30°; while on the right the hill is made up of alternations of hard beds of trap and softer ash lying in a long synclinal trough faulted at several points, each hard bed forming a prominent terrace on the hill-side, at first dipping south at about 35°, then flattening out above Sosgill, and afterwards dipping north at a low angle above Low Bridgend.

The various faults that run through this district tend often to produce marked effects upon the scenery; not that the actual dislocation has given rise, upon the ground, as we now see it, to gaping fissures or long precipitous walls of rock, but that rocks of various degrees of hardness having been thrown together along the line of fault, the denuding powers have acted unequally upon them, giving rise to well-marked features. The peculiar wedge-shaped form of Honister, as seen from Buttermere, is due in great part to faults meeting at an obtuse angle and throwing the comparatively soft Skiddaw slates against the hard traps and ashes of the Borrowdale volcanic series, the latter forming the steep craggy upper parts, and the former the more sloping and grassy ground towards the base of the great wedge.

Lines of fault are often found to run through mountain gaps or passes, unequal weathering having taken place along such lines. Such cases may be well seen on High Rigg, between St. John's Vale and the Naddle Valley, where advantage has been taken of these long breaks in the small rocky escarpments to build straight stone walls, so that the fault and the wall very often nearly coincide.

Before closing this subject I wish to call attention to the very great number of wholly or partly filled-up lakes scattered over the district. Upon the fell-tops one constantly meets with tarns now converted into peat-mosses or filled up by stream-borne detritus. In the main valleys old lake-beds are also numerous, and every existing lake is partly filled

up at its head. Derwentwater and Bassenthwaite Lake were almost certainly at a former time one long sheet of water; but the river Greta has deposited a large delta in its midst, and now the lakes are parted by some three miles of alluvial land. In like manner Buttermere and Crummock Water were formerly one; but streams from the mountains have brought down their stony freight and formed a delta, dividing the once long lake into two. Most of the Cumberland lakes that I have yet examined seem to be true rock-basins; that is, they lie in rock-hollows, which have been rounded and scratched on all sides by the old glaciers, leading one to the belief that these hollows, if not actually formed by the scooping power of the ice—as Professor Ramsay's theory suggests—have at least been deepened by it.

The terminal moraines of the last set of glaciers often form a marked feature in the scenery, as for instance, up Greenup Gill, and above Seathwaite, Borrowdale; on the east side of Honister Pass; up Longstrath Valley and at the head of Langdale; and in Ennerdale Valley, near where the footpath crosses from Buttermere to Wastdale. At this last spot they are particularly striking when looked down upon from above, and by some people have been taken to be innumerable tumuli. Some long mounds found in the lower parts of large valleys, as at the ends of St. John's and Naddle Valleys, and exactly resembling moraines on the outside, are formed of fine false bedded sand and gravel, and these, as well as undoubted moraines, have sometimes formed lake-dams, though now cut through and the lake drained.

I trust it will now be evident that not only *different types of scenery are associated with different classes of rock*, and that *atmospheric agencies have the power of forming scenery as a whole*, but also *that all the scenic detail and finer tracery are due to these agencies working upon the minute peculiarities in structure and composition of each kind of rock.* But it is evident, that if this be the way in which nature has worked to produce our beautiful scenery, there is yet something to make sure about. It cannot be so, unless the apparent weakness of the agents should be amply compensated for by the length of time through which they may have acted. This length of time we have at present only assumed, and to show you that the assumption is a true one, it remains for me, in as few words as possible, to give you an *outline* of the past history of the Lake district.

The oldest rocks in the district are the Skiddaw slates; these are very ancient finely stratified mud rocks, containing in some places remains of marine shells, worm-tracks, fucoids, shrimp-like crustaceans, and graptolites. These ancient mud deposits, however, have been hardened, altered, contorted, and cleaved. Their thickness is very great, and requires an enormous period of time for their formation. The marine conditions which probably prevailed for this long time over the district were closed by a great series of volcanic eruptions, at first submarine, the ashes ejected being stratified beneath the sea and the lavas flowing over its bed. Very probably some areas of dry land were then formed by the accumulation of volcanic material, aided perhaps by elevation of the sea bottom. The total absence of ordinary marine sedimentary deposits and of any traces of fossils, in the whole of the great thickness of ashes and lavas now forming the mountains of Borrowdale, would seem to indicate that much of the material must have been ejected upon dry land and part of it perhaps deposited in large crater-lakes, for while there are great thicknesses of unstratified or but rudely stratified ashes and coarse breccias associated with the lava-flows, there are also many intercalations of exceedingly fine-bedded ash, apparently deposited beneath water of some kind.

On the close of the volcanic activity, the district was again sunk slowly beneath the sea, and the various limestone, sandstone, and shale beds of Upper Silurian age were deposited unconformably upon the great thickness of volcanic material. The remains of these rocks may now be studied south of Coniston and Windermere. At the close of the Silurian period another gradual upheaval of the ocean-bed took place, and as the land slowly rose above the sea, its waves planed away vast thicknesses of the strata, just as the sea is now doing along our coast-line hard by, until when at length the upheaving powers had got the mastery and a tract of land stood fairly above the sea-level, the lower rocks were in many places exposed at the surface, by reason of the denudation which had carried away the upper.

This tract of land being thus upheaved, the rocks then curved, contorted, and cleaved, formed the roughly-hewn block, so to speak, out of which atmospheric agencies have ever since been carving and sculpturing its present beautiful aspect. Around it were deposited the old red conglomerate beds; then the carboniferous limestone seas probably only washed its base, and afterwards coal-measures and the Permian strata were formed around. And so on through the whole of the great secondary epoch, during which the trias, lias, oolite, and chalk strata of the greater part of England were being formed, was this district probably above water and exposed to the denuding agencies of the atmosphere. Also, through the whole of the Tertiary epoch we have no evidence of submergence, until in the midst of the last glacial period the country probably was sunk beneath the sea to a depth of *at least* 1,500 feet. This immensely long stretch of time, from the Old Red to the Glacial period, seems to my mind more than ample for the

formation of all our valleys and glens by the atmospheric denuding agencies we now see in operation; and the wonder is rather that much more has not been removed, for during these past ages the climate must have changed more than once, snow and ice alternating with almost tropical warmth, and therefore every agent having its full powers in turn.

One most interesting point clearly comes out from the consideration of this history; viz., the much greater age of our Cumberland mountains than many of the snow-capped ranges of foreign countries. The rocks forming the summit of the Dent-du-Midi were being deposited beneath the sea during Tertiary times, when the Cumberland mountains had for ages past been slowly assuming their present form. The chains of the Alps, the Apennines, and much, at any rate, of the Himalayas, are but infants in age compared with our humble English group of mountains, and while they can boast of their present sublime height, these our hills can pride themselves in their past great age.

In bringing these remarks to a close, I would call attention to the fact that that which often seems to us destruction and decay, a blot on the fair face of nature, may, after all, when rightly regarded, be but the harmonious ringing out of nature's changes; that though the storm wastes the mountain-sides, and the frost splits up the craggy rocks, yet are the mountain-form and craggy outline but the offspring of these actions.

THE EUROPEAN BRISTLE FERN.

(*Trichomanes radicans.*)

THE following hints gained from personal experience might, I thought, prove useful to some of your numerous readers.

In the first place, to grow the Trichomanes, or Killarney Fern as it is sometimes called, satisfactorily, we should endeavour to imitate nature as far as possible. All the ferns belonging to this genus are widely distributed over the warmer regions of both hemispheres, but are more especially abundant in tropical America. "They grow (writes Dr. Moore) only in situations where shade and moisture abound: indeed, their structure is not adapted for situations which are exposed or influenced by a trying atmosphere, and exposure for a few hours to conditions like these would suffice to shrivel up their fronds. Their natural habitats are the deep recesses of tropical forests, where they luxuriate on the trunks of trees or on dripping rocks, surrounded by an atmosphere loaded with vapour." To imitate these conditions as far as possible, there is no better contrivance than the Wardian Case, and the *modus operandi* is as follows:—

The case selected should be of moderate size; indeed I think it better to have it rather large than otherwise, on account of this fern, owing to its mode of growth, being somewhat difficult of removal; one say 3 ft. long by 1½ in width, and 2½ feet high, would do very well. The sides should be constructed of single panes of glass, and it is essential that both top and sides be made to open, as all filmy ferns require to be constantly sprinkled overhead. The soil-box should be entirely independent of the glass case, so that it can be lifted off and on at pleasure, and should be about six inches deep: a neatly-made *wooden* one lined with pitch, having a small tap at the bottom to let away any excess of water, is far preferable to one constructed of zinc or other metal.

In preparing for planting, the first thing is drainage. I generally commence this operation by placing at the bottom of the box two or three small upturned flower-pots, also a few good-sized lumps of sandstone, the tops of which should rise half an inch or so above the soil when put in; then fill up all around with bits of broken flower-pots or *pumice-stone*—the latter is better, on account of its lightness—to within about an inch and a half of the rim of the box. So far so good; the next thing is to prepare the soil.

The compost which suits the Killarney fern best I have found on trial to be about equal parts of silver-sand (combined with bits of charcoal, small cinders, pumice-stone, and pounded flower-pots) and nodules of turfy peat: be careful to allow none of the actual *peat-soil* to get mixed in it, as it is apt to impede the drainage. Now, before you amalgamate these several ingredients, place the peat in a basin and put in the oven, give it a good baking for at least forty-eight hours, in fact, until the soil is quite dried up, so that you are sure that all grubs, seeds, &c., which may be latent in the soil, are destroyed. This last operation, although not often stated in the various pteriological manuals, I can fully vouch the importance of, and, if not attended to, will occasion endless trouble.

After the baked soil has been brought to a proper state of consistency, by watering with water previously boiled, and combined with the sand and other materials, it may be spread over the crocks in the box, and the interstices between the bits of sandstone and peat which may occur filled up with silver-sand.

Nothing now remains but to fix the creeping rhizomes of the plant down on the soil by means of incorrosive wire; then finish off by two or three moderate waterings at intervals of half an hour, and when thoroughly drained, the case may be closed and placed in position.

Lastly, I may add, with regard to that *position*, that it ought to be somewhere out of the sun; warm, and well shaded; a piece of oiled lawn thrown

over the case answers admirably for modulating the light. By all means take care never to let the least frost touch the plants, or they will never thrive.

J. S. William Durham, F.G.S.

THE TORTOISE AND ITS SKELETON.

THOSE who have never examined the bony framework or envelope of a tortoise, can form no idea of its complicated structure, of its wonderful mechanism. In the living animal we see only the horny plates, known as tortoise-shell, beautifully coloured indeed and contrasted; but remove these, which can be easily done after the animal is dead, and putrefaction has accomplished its end, and the wonderful sutured conformation of the upper and lower shields strikes us at once with amazement. These dove-tailed lines, which help to fasten the bony plates that constitute the *carapace* and *plastron*, must not be confounded with the indented lines which correspond in size and shape to the plates upon which these latter rest.

Physiologists inform us that the upper shield or *carapace* is covered entirely by a skin; attached to which, probably by minute fibres, are the scales. When the tortoise is dead and decomposition has set in, the skin, to which the plates are attached, is resolved into its constituent elements; the power of cohesion is dissolved, the plates become loosened and then easily separated.

To the rest of the reptiles tortoises present an anomaly; the broad osseous plates which extend along the medial line of the carapace are supposed by comparative anatomists to be the superior spinous processes of the vertebral column, highly developed, and connected together by sutures. The ribs, also developed into large and flat bones, are attached to the margins of these processes, and constitute the costo-sternal plates, representing the sternal ribs of some saurians.

The plastron, composed of nine pieces, has been proved to be the *sternum*, of course highly developed.

About a year ago I buried a favourite tortoise which died on the approach of winter. I closely sealed it in a wooden box in the garden, and have lately exhumed it. A portion of the lid was broken in, the work, no doubt, of some clumsy gardener, and consequently a large amount of wet mould had been washed in by the late rains: on attempting to clean the remains, the whole fabric fell to pieces! Scales fell off, bony plates became detached, and all that remained firm was the spinal column, which is naturally consolidated to the vertebral plates.

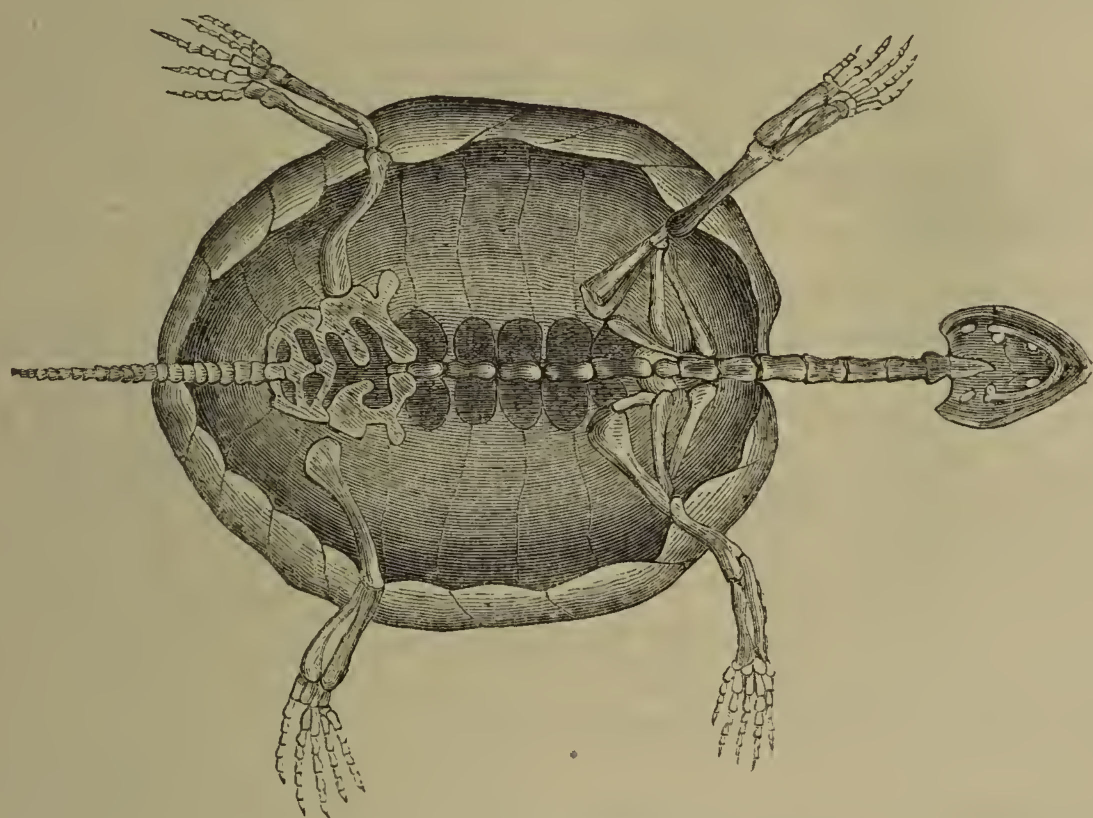

Fig. 79. Skeleton of Tortoise.

I was always under the impression that this species, obtained from Leadenhall Market, was *Testudo Græca*, until it dawned upon me that in that genus the sternum is immovable, whereas in my specimen, the *hinder part* of the sternum could be moved; so I was forced to come to the conclusion that it is *Chersina marginata*, a species which has often been confounded with the former, and the posterior part of whose sternum *is* moveable.

The scales in general are yellow in the centre, with radiating black, or rather dark brown, blotches round the margin; in some scales the reverse occurs, the centre being black. The shell, in my opinion, is much prettier than its congeners, and differs from it in general appearance.

One cannot but be struck with the *marginal*

scales, which are characterized by being doubled under, so as to embrace the interior surface of the carapace, thus giving them a more secure fastening; in some the duplication is only partial. These scales are very thin, flexible, horny, and elastic, marked with concentric lines of growth, which lines are also present, I find, on the upper surface of the bony plates.

M. Bibron has conjectured that the Bordered tortoise is included by Aristotle under his description of the Earth tortoise ("Hist. Anim.," l. v. c. xxvii.), and, we ask, may not the land tortoises said by Pliny to inhabit the deserts of Africa, and called by him *chersinæ*, be this species? It may, indeed, be *T. Mauritanica*, which is also very abundant in that region: probably Pliny includes both.*

E. Halse.

* Compare Pliny, "Hist. Nat.," l. iv. c. 12, l. xxxii. c. 14.

WHAT WAS THE TRUE COSSUS OF THE ANCIENTS?

THAT the old Romans were partial to some large wood-boring larva as an article of food, is certain; we know, too, that it bore the name of Cossus. But beyond that we are left in darkness, except that the animal is said by Pliny to live on trees, to change into an insect with long antennæ, and to have the power of emitting a rather shrill sound—"Sonum edunt parvuli stridoris" ("Hist. Nat.," xvii. 24). The larva, whatever it was, was held in the highest estimation by the *gourmets* of Rome as a singular delicacy, and was fattened for the table on meal.

Linnæus, when introducing his new nomenclature, unfortunately pitched upon the Goatmoth as the representative of the classic Cossus, and under the name of *Phalæna cossus* (now *Cossus ligniperda*), left the impression on the public mind—an impression which will probably never be completely eradicated—that the refined and wealthy Romans were so degraded in their tastes as to dine off that most unpleasant of all caterpillars. The hircine odour with which the larva is impregnated, and which is expressed in its English name, is due to an oily matter, which it can disgorge for the purpose (it is believed) of softening the woody fibre on which it works.

Surely this alone would prevent us from believing that the countrymen of Epicurus could indulge in so disgusting a feast. It is true that insects, as Mr. Auld observes (p. 59), still form a part of man's diet, but never among refined and really civilized nations, though many a larva, too dreadful in aspect and odour to be permitted "to come between the wind and *our* nobility," is held to be a delicacy by savages in all parts of the globe. The larvæ of all the woodboring beetles are eagerly sought after by the aborigines of Australia, especially the "*Bardé*," latinized into *Bardistes cibarius*, which, though exhaling an odour at least as pungent as that of our Goatmoth, is much relished by the natives of King George's Sound. The negro of the West Indies and tropical America searches diligently for a grub, bearing the name of Gru-gru, the parent of which is known to Europeans as the Palm-borer, or Palm-tree Weevil (*Rhynchophorus palmarum*). The egg of this beetle develops into a fat footless grub, an inch and a half long, of a white colour, which even the Creoles are said to relish occasionally, though it has never formed a regular article of food among them. In the Moluccas, Wallace tells us, the grubs of the Palm-beetles are regularly brought to market in bamboos and sold for food. The natives of Mexico make the larva of *Trichoderes pini* (a member of the long-horned section of Beetles) a part of their fare.

Naturalists are much divided on the knotty question of the true Cossus of the ancients. Some are inclined to give the distinction to the Stag-beetle, whose larva is sufficiently large to make a juicy mouthful; others contend for some species of Rhinoceros beetle (Oryctes); while some are in favour of the exotic Rhynchophorus. Kirby and Spence are in favour of some large species of the "Capricorn tribe;" and of these the French entomologist Mulsant has fixed upon the larva of the handsome beetle called *Cerambyx* (or *Hammatochærus*) *heros*. This is a very rare insect in England; indeed, the specimens found here are probably imported in foreign wood. But in many parts of Europe "heros" is counted among the pests of the forest, the female depositing her eggs on the Oak.

Pliny's Cossus was also an oak-borer, which the Goatmoth is not; but then what are we to make of the "parvulus stridor," which the Roman naturalist attributes to his insect? The only larva which is now known to utter sounds—so far at least as I am aware—is that of the Death's-head Hawk-moth (*Acherontia atropos*). "The noise made by the caterpillar was first noticed by Fuessly: when disturbed, it draws back its head very quickly, making at the same time a loud snapping noise, which has been compared to a series of electric sparks" (Newman, "British Moths"). Unfortunately, however, the caterpillar does not live on trees, nor are the antennæ of the perfect insect at all remarkable for their length.

Altogether the subject, a very curious one, is "shrouded in mystery."

Itchen Abbas. W. H. Spicer.

"In most cases Nature heals a wound after her own fashion better than any one else can do it for her."—*Masters' "Botany for Beginners."*

VARIATION OF COLOURS IN FLOWERS.

THE variation of colour in the flowers of plants is a subject which, although generally of much interest to observers residing in the country, has hardly, perhaps, been treated with a fair amount of attention by those who investigate deeply the conditions of life under which plants are found. In the hope that some examination of this matter may be made by those whose studies have peculiarly fitted them for such research, and in the belief that such examination would not be without its results as regards the explanation of the causes and reasons for such variation, I desire to record an instance of a change from the normal colour which I venture* to think is very uncommon, and, as far as I have been able to search, wholly unrecorded, at all events as occurring in the indigenous plant. With three exceptions, none of the authors, British or foreign, whose works I have been able to consult, make the slightest reference to a coloured perianth in *Convallaria majalis.* The exceptions are Gerard, who says (Johnson's edition, p. 410, incorrectly numbered 386): "The seconde kinde of May Lillies is like the former in every respect, and herein *varieth* or *differeth* [Mark the difficulty at this early date in deciding upon the question—species, or variety?] in that this kinde hath reddish floures, and is thought to have the sweeter smell," and "the other kinde with the red floure is a stranger in England: howbeit I have the same growing in my garden." Next, Martyn who, in his edition of Miller's "Gardeners' Dictionary," has the following passage:—"A fourth with reddish or red flowers: this Mr. Miller affirms continued the same above forty years [apparently in the Chelsea garden]: the flowers are smaller, the stalks redder, and the leaves of a darker green than in the common sort." And lastly, Sir James Edward Smith in the "English Flora," 2nd edition, vol. ii. p.154, says: "There are varieties with double, or with purple flowers, sometimes seen in gardens, but not easy of cultivation."

In May last year the Rev. W. Tuckwell, Head Master of Taunton school, very kindly went with Mr. F. J. Hanbury and myself for a few hours to the Quantock Hills; and in one of the lovely combes for which those hills are so well known, he took us to one of two patches of *Convallaria majalis* bearing rose-coloured flowers which were known to him in that locality. The time of flowering was almost over at the date of our visit, the 15th May; but enough blossoms were left to afford ample evidence that the aberration of colour from the pure white of ordinary "lilies of the valley" was no slight or accidental eccentricity of tint but a definite and strongly-marked change.

* Verlot, as quoted by Mr. Darwin in his work on the variation of animals and plants under domestication, says "that flowers which are normally white, rarely vary into any other colour."

The colour of the perianth was a full-pink, inclining to rose, with no trace of any purple tint. The patch of plants was of very considerable extent, and a like patch bearing similar flowers was known to Mr. Tuckwell in, I believe, the same combe. The plants had every appearance of being indigenous, and I am not aware of any fact which would throw doubt upon their being so. Mr. Watson, in his "Cybele Britannica," vol. ii. p. 467, states that "in the Peninsula and Channel provinces, it [*Convallaria majalis*] would seem to be quite local, and indigenous only in the counties of Somerset and Wilts;" there is therefore little probability, if any, that this rose-coloured variety is an escape from cultivation, even if it is a variety known to be cultivated. The remarkably red colour of the soil—Devonian or Old Red Sandstone—where the plants grow, offered a temptingly easy explanation of the cause of the colour in the flowers, and I am not altogether disposed to throw aside this idea, though probably there are few facts which could be adduced as evidence in favour of such a theory, the change in the colour of Hydrangeas, ascribed by some gardeners to growth in peculiar soil, being, though very remarkable, often capricious and certainly not permanent.

I know of no instance amongst indigenous British plants of a change in the flower from pure white to any shade of pure red, such as we have in this *Convallaria* except, perhaps, in *Silene pratensis* and *Cratægus oxyacantha*, and in the curious-coloured central floret of *Daucus carota*, though possibly there is some tendency to variation in colour in the perianths of liliaceous plants.

I do not find that my specimens of this *Convallaria* differ in any material respect from the descriptions of *Convallaria majalis* or from the specimens in my herbarium, though some from "Overton hills, Cheshire," present a marked contrast of habit, the limb of the leaves of the Cheshire plants springing from the leaf-stalk at little more than an inch from its base, whilst in my plants from the Quantocks, and also in some from the Vosges mountains, the limb of the leaves springs from four to six inches from the base of the leaf-stalk.

Miller's statement that the flowers of his plants were "smaller, the stalks redder, and the leaves of a darker green than in the common sort," affords hardly any good character even for a variety, but certainly the membranous sheaths of the Quantocks plant are more or less highly-coloured red and the leaves are very deep green.

I have placed some plants in my garden, and I hope to see whether or not the change of soil will affect the colour.

Perhaps Mr. Tuckwell could, as I have been expecting him to do, give some information regarding this curious plant. FRED. STRATTON.

Newport, Isle of Wight.

STING OF WASP.

THE following sketches will perhaps help to explain my notions about the structure of the lancets of the wasp's sting :—

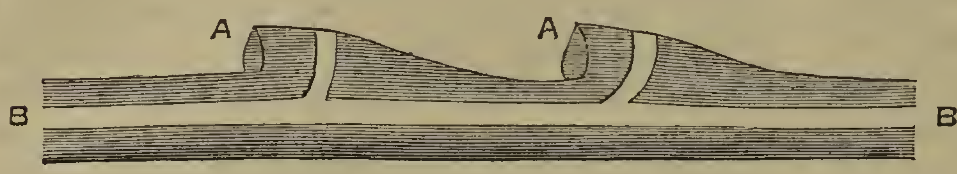

Fig. 80. Side view of two teeth of the lancet, × 500. A. The teeth. B. The tube and its branches.

Fig. 81. Front view of ditto.

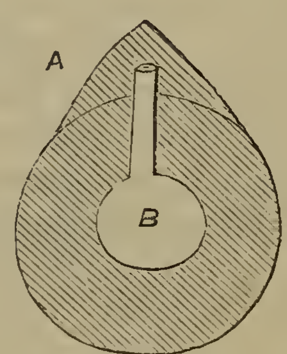

Fig. 82. Transverse section through one of the teeth.

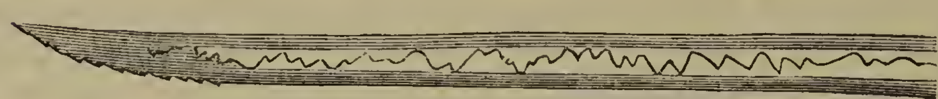

Fig. 83. Lancet, with duct running through the tube, × 50.

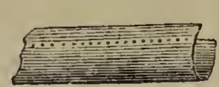

Fig. 84. Broken piece of lancet, showing tubular character.

R. H. NISBETT BROWNE.

A FAMILY OF LIZARDS.

IN March, 1871, I obtained two scaly lizards, male and female, the former distinguished by the red under-surface. These I put in a box with a glass front, constructed so as to keep out the rain. After I had kept them for about two months, I placed the box out in the garden, resting on a saucer and brick. I then gradually educated the male in taking walks on the lawn, at first watching him and putting him back in the box after a short turn, and then leaving him to amuse himself. The female did not avail herself of the opened door till one morning, not getting her usual supply of food, she sallied forth in search of it, and afterwards was always ready to come out. She used to spend a great deal of time on the brick on which her house stood, enjoying the warm sunbeams, and retired under the saucer at night. At last the male disappeared for a week. At the end of that time he came one morning to the brick, where the female was sitting, and from that time never strayed far, until his final departure. For a week, on every sunny morning, the female came from under the saucer and waited on the brick. The male them dropped himself down from a hole in the wall hard by, and ran to the brick also. During the day they pursued each other among the grass, on the brick, and under the saucer, and at night retired respectively to the hole in the wall and the saucer. I used to shift the latter from its position, in order not to destroy the grass under it. One day I did this, and the grass being damp, the female went to some resting-place, that could not have been very far off. The next morning the male came out of his hole, went to the brick, but found no one waiting for him. He remained a short time, and then departed. Almost immediately afterwards the female came up, but the male was never seen again.

The female, however, still stuck to the brick ; nor do I remember any loss in her appetite, which was always extremely good. Nothing came amiss to her ; large flies, spiders, and caterpillars were devoured in rapid succession. Once she made a meal of an earth-worm. I have seen her, after a good meal, appear hardly able to move. She took food readily from the hand, and was remarkably tame. At first she was very retiring in habits, much more so than the male, but afterwards became the tamer of the two. Thus she went on till August, when she was unfortunately injured in mowing the garden. She was last seen with a portion only of her tail. She left behind her a family consisting of two young ones, who ran about the garden, alone or together, quite untrammelled, from their birth to their death. There was a very small hole in the wall, into which they both contrived to thrust themselves. This was their usual home. They also affected one or two other holes in a lesser degree. They were tolerably tame, and would eat little hunting spiders that were common about the wall. The young lizards were very dark-coloured, quite different to their parents. I have seen one run several feet up a wall, among the foliage of a peach-tree, in mere buoyancy of spirits.

I let them choose their own winter quarters, thinking they might reappear in the spring ; however, though they disappeared at the proper season of the year, they failed to reappear in the ensuing spring, and so my family became extinct. Though I have since had several lizards, I never had the same success. I was always in too great a hurry to begin their training in the garden, in which case their first walk

is likely to prove their last (as, before they have been kept some time, they have not any attachment to their habitation), or some other calamity has overtaken them. I used to find that my lizards, contrary to what might be supposed, object to the full glare of the summer sun, and on very hot sunny days keep in the shade. They would lap water greedily, if they had been some days without it, preferring it to milk. I gave them for a bed dry grass, as they always objected to it when damp.

A. ALDRIDGE.

SALLOW-BEATING.

IT is in the month of April that the Sallow shows its golden catkins, branches bearing which are gathered, under the name "palms," by the children in some parts of the country on the eve of the Sunday next before Easter, or Palm Sunday, as it is called, in commemoration of our Saviour's last and triumphant entry into Jerusalem, when the people went forth to meet him strewing branches of palm-trees in the way. The appearance of these catkins is welcomed with delight by the naturalist, as they usher in the mild and genial weather, in which he can awake from an hibernal slumber to another year of assiduous labour.

The Sallow belongs to the *Salix* or Willow tribe, and delights to grow where the soil is moist. It is chiefly used in the manufacture of wicker-work baskets, for which purpose the young shoots are lopped off every two or three years, so that it is seldom allowed the chance of showing its natural beauty in districts where thus treated. When undisturbed, and growing in a favourable situation, the Sallow will often attain an altitude of forty feet. Those who have been amongst the palm-bushes

Fig. 85. Marsh-fly (*Dolichopus simplex*), from an enlarged sketch by R. Connor, Esq.

THE MARSH-FLY.

(*Dolichopus simplex.*)

WE give the following beautiful illustration of a common object, the Marsh-fly (*Dolichopus simplex*), on account of its being printed by a new process called, after the discoverer, *Dallastype*. We are not acquainted with the process, as it is, of course, a secret. It is based on photography, and therefore accurately represents the objects it delineates, as fig. 85 shows. The drawing of the Marsh-fly is from a pen-and-ink sketch by R. Connor, Esq., whose able pencil we purpose engaging on other natural history subjects.

know what a delicious fragrance pervades the surrounding atmosphere, and what a host of bees and flies gather round the downy catkins to extract the alluring nectar contained therein. In the day-time many entomological treasures may be found on the palm; but it is of the moths that flock thither by night I am about to speak.

The method of taking moths from palm is known to practical entomologists by the name of "sallow-beating." The following are the requisites for a sallow-beating expedition. A good stout umbrella, which to a naturalist is useful for many purposes, is indispensable; a lantern is of course necessary; and for this work a flat-faced one is preferable to a "bull's-eye," its light being not too powerful, and at the same time distributed over a larger space. The cyanide-bottle, a pocket box, and pins should also form part of the equipment, and as many chip boxes as can be conveniently stowed away in the pockets will be found to come in very useful. Finally matches should not be forgotten, for in a wood far from any habitation, and unable to procure a light for his lantern, the entomologist will be unable to go to work. Provided with these things, he may sally forth to a place where the Sallow is known to grow; but if there should be an easterly wind, or should it it be moonlight, it will be as well to remain at home, for such nights bring but little to the lepidopterist. However, supposing the nights to be dark and mild, with a gentle breeze from the south-west, he may set out nothing doubting, as on such a night he may anticipate some good captures. Having reached his destination, he should cut a stick sufficiently long to reach the top of the bushes he intends operating upon. With this addition to his collecting apparatus he has all that is necessary to commence work.

As soon as it is slightly dusk, the moths begin to approach their nocturnal feast. By standing near to one of the sallow bushes, they may be seen as they come buzzing by from all quarters, though at first all around seems still, and the solitude only broken at intervals by the jarring sound of the Goat-sucker. Shortly after dusk the majority of the moths will have settled, and the collecting may be commenced. The *modus operandi* is very simple: the umbrella being opened, is held beneath the bush to receive a shower of moths brought from the branches above by the administration of a few sharp taps from the stick. Great will be his surprise who tries sallow-beating for the first time, to see such a multitude of moths in the umbrella. Many of the autumnal species that have been hibernating will be among the captives, the commonest of which is perhaps *Anchocelis pisticina*, and a few other species of the "Chestnuts." The "Quakers" are always at the palm in great plenty; *Tæniocampa cruda* is quite a nuisance to sallow-beaters, on account of its abundance; but many rarities can be thus secured.

That prize *Dasycampa rubiginea* is often found in the umbrella, with many others by no means common; such as *Trachea piniperda*, *Tæniocampa leucographa*, and *miniosa*. On a fair night the boxes can soon be filled with fine specimens of good moths. It would be impossible to take all beaten off the palm; therefore those that are most desired should be selected, and the others allowed their liberty. The chosen victims may be cyanided and pinned on the spot, or they can be pill-boxed, each individual in a separate one: if two be inclosed together, the one is very likely to damage the other. It is advisable to kill at once those of a lively nature, and to carry their quieter brethren home alive.

If the largest sallows are to be worked, the ground beneath should be spread with sheets or other white cloths; and a long light pole is required for the purpose of beating the upper branches; but as this involves much labour, two or three entomologists should unite in carrying it out. In conclusion, it is to be recommended that only the male or yellow catkins be beaten, as, although the green, or female ones, attract a few moths, they do not yield so many as the male.

These few hints may be useful to some young entomologists; but if they set out and return disappointed they should not be discouraged. They will do well to bear in mind that few moths venture forth from their hiding-places if the night be inauspicious; but when it *is* favourable they will crowd to the palm in almost incredible numbers, and many species may be met with new to the collector. HENRY A. AULD.

A FEW OBSERVATIONS ON THE SMOOTH NEWT.—No. 3.

(*Lissotriton punctatus.*)

I HAVE read with much pleasure Mr. Ashbury's "Supplementary Observations on the Smooth Newt," corroborative as they are of the fact of the Newt, when in the aquarium, divesting itself of its old skin. Mr. Bell, in his "British Reptiles," says: "The Newts shed their skin in the same way as other aquatic amphibia; it comes off in shreds, and is washed away as it becomes loose." When speaking of the species under notice, the same writer says: "The growth of the young animals during the summer and autumn is very rapid, so that they attain nearly their adult size the first year." May not the fact of the Smooth Newt divesting itself of the old cuticle be principally attributable to the higher temperature in which it is kept in confinement; and, possibly, in part to the food given it? Both Mr. Ashbury's and my own Newt were fed chiefly on meat. Higher temperature with these reptiles means excess of life. With increased vitality there will probably

be uneasiness at the constraint caused by the obsolescent cuticle, and a desire for liberation from it; thus causing the reptile to make an effort to that end. The tadpole of the Smooth Newt reared by myself last year, when leaving the water on the assumption of the adult form, was shedding its skin: it was then, as described by Mr. Bell, "coming off in shreds." Its food had been such as was obtainable in a small aquarium stocked with aquatic plants.

It is very probably due to an inadequate supply of aliment that the young Newt in the aquarium does not duly attain the adult size. Of this I am satisfied, partly by the great disparity in size of those tadpoles reared by myself last year, but chiefly by a number of frog tadpoles which I had hatched from spawn in my aquarium two years ago. From nearly one hundred of those tadpoles I selected one, putting it in a vessel by itself for closer inspection; the others were kept in a fair-sized aquarium well stocked with plants. Thirteen days after, the solitary individual was one-fourth larger than its fellows, which were, however, as mature, so far as the absorption of the branchiæ and outward appearance were concerned. Eleven days later it was one-half larger. A few days subsequent, however, a quantity of aquatic plants, taken from a swamp, being put into the aquarium, and allowed to float on the surface of the water, supplied them with abundance of aliment, and henceforth they throve amain, most of them being afterwards developed into the frog state.

Last year I again kept the Smooth Newt (a male and female) for a time, and had the ova deposited, not in the aquarium, but in a large glass jar, into which the Newts were put on their receipt, along with some *Callitriche verna*, brought with them, and remaining unplanted. Upon the leaves of those plants were the eggs deposited; some, as on former occasions, in a folded leaf, some on under side of leaves, and some between two leaves: these two latter positions were probably owing, partly at least, to the *Callitriche* being unplanted, and consequently unstable. The Newts were got on June 15th, and three days later the first egg was discovered. More were laid the following day, and up to July 1st others were deposited. On the 21st of June, in the afternoon, I removed the female Newt into another vessel, in which were growing a few plants of water-thyme. On the following morning three eggs were discovered deposited near the top of one of the plants in close proximity; two in fact were touching. Other eggs were afterwards laid, but always singly, and on separate leaves.

The eggs of the Smooth Newt are not, as stated in my first paper, spherical, but oval. This was readily seen in those eggs laid on the surface of the leaves. On my first acquaintance with the eggs of this species, on June 17th, 1871, they were greatly advanced, and it was not until later that the folded leaves in which they were deposited were sufficiently reopened by the maturing tadpole to admit of an opinion being formed as to their shape. They were then as represented by the figures in that paper (page 128, last volume), the form undoubtedly being determined by the body of the inclosed tadpole pressing against the sides of its envelope, combined with the position of the egg on the leaf.

The ova of this Newt was kept in a high temperature, and its development was rapid. In from ten to twelve days from its being deposited, the tadpoles were hatched. The first was hatched on June 28th, the last on July 11th. Many were the sizes of the tadpoles, but one far exceeded its fellows. This one was on July 25th about three-fourths of an inch long, and possessed of hind legs. On August 23rd its branchiæ and tail-fin were degenerating; on the 25th, very observably so. On the 28th it was out of the water upon a piece of wood placed for serving that purpose; its branchiæ were then nearly gone, and consisting of three short points only, and it was shedding its skin, which hung upon it in shreds. It would now be about one inch in length. On the following morning it had disappeared, as had ere this its elders.

Newcastle-upon-Tyne. C. Robson.

MICROSCOPY.

Mounting with Balsam.—Your correspondent F. Kitton is, I think, quite wrong in saying the most important condition in mounting with balsam is to keep the balsam free from chloroform. Until I began to use chloroform very freely in the different processes of mounting with balsam, I could make very little progress. Mr. Kitton's plan I found very troublesome, and to result in many failures. My own plan is to mix chloroform with the balsam until it is sufficiently fluid to drop nicely from the neck of an ounce vial. I prepare the objects in the usual way, soak them in turpentine from a few minutes to several weeks, according to the nature of the object, then place them on the slide, drop the balsam on, cover with small round glass, and set aside for some days; by the end of this time, which varies according to the nature of the object, all the air-bubbles will have made their way from under the glass (unless actually inclosed in the substance of the object, which indicates either too short time in the turpentine, or, in some cases, the absolute need for the use of an air-pump). The slides can be left in this state until these are sufficient to bake, which I manage in the following way:—I have a tin or copper box 12 inches square, by 2½ inches deep, flat on the top: this holds three dozen slides. I fill the box with water,

place the slides on the top, and on each a flat bullet or large shot. I then put a gaslight under the box, and keep the water nearly boiling for about forty-eight hours: the slides will then be sufficiently baked, and may be cleaned, and finished off by putting a ring of black, or other varnish, round the edge of the glass circle. I found the use of the spring clips very objectionable, as I was always getting too much or too little pressure on my slides; but by having various sizes of bullets and shot, I can put just the weight I require on each slide. The bullets are flattened by striking them with a hammer. This process prevents all possibility of getting the balsam to the boiling-point, and at the same time gives as much heat as is required. I have exchanged many slides with your correspondents, who have, without exception, expressed a very favourable opinion of them. I should say that, if the object is very thick, and consequently the balsam thick round it, it should bake rather longer. The two funnels are merely to allow of the expansion and contraction of the water as the heat varies. My objections to Mr. Kitton's plan (though in his hands no doubt through practice it is successful) are that air, if it gets in, will be difficult to get out, instead of going out itself, as in my plan;—that it affords no opportunity of carefully examining the object when on the glass to remove any dust or hairs;—that the wire clip will often crush a valuable object, or not subject a strong object to sufficient pressure, and that the slide will sometimes get too hot over the lamp and spoil all the work. I also use chloroform in other ways, but I have trespassed sufficiently upon your space at present.—*C. L. Jackson.*

A Polariscope.—"F. M. S." will find a description in "Pereira's Lectures on Polarized Light," of an apparatus constructed by Prof. Powell for examining the polarization of light by fluids. There is also a fuller account of the apparatus in the *Philosophical Magazine*, April, 1843. The amount of rotation which a ray of light suffers during its passage through the liquid is measured by an index attached to the analyzer, and moving on a graduated circular metallic plate.—*R. H. N. B.*

"Interference."—In reply to Horace Wilson's question, I beg to say that if he will light his lamp when the daylight is failing, and hold a pencil perpendicularly on a sheet of paper near the window, so as to balance the lamp- and day-light, he will see two shadows of the pencil on the paper. One, cast by the lamp, will be illuminated by the *blue* daylight, and (surrounded by the yellow lamplight) will appear blue, as "H. W." describes. The other, cast by the daylight and lighted by the lamp, he will see to be a bright yellow, being surrounded by the yellow lamplight. The experiment shows, by strong contrast, the great difference in colour between artificial and sunlight. It has nothing to do with interference, but is interesting to microscopists, artists, &c., who work by both lights.—*G. W.*

Definition of Structures.—So far as I understand Mr. Thomas's query, I am afraid he requires an impossibility, for it is most assuredly impossible to obtain a high amplification, and at the same to have a large portion of the object under examination visible; a 2-inch objective shows about a $\frac{1}{4}$ of an inch, a 1-inch about $\frac{1}{12}$ of an inch, and a $\frac{1}{4}$-inch $\frac{1}{50}$ of an inch of surface. Surely there would be no difficulty "in discovering and clearly and distinctly defining what is required, viz., the form, position, &c., of the object under examination," by successively increasing the magnifying power, commencing with a 3-inch, and afterwards using a 1-inch and $\frac{1}{4}$-inch objective, particularly if a binocular is employed.—*K.*

The "Science-Gossip" Section-cutter.—In No. 92 (August 1, 1872), an instrument for cutting vegetable sections was figured and described by Mr. W. White, of Litcham. The instrument there described was a copy of the one he was using himself; he has since made some improvements in it, and at the request of several friends, he has had some manufactured under his own directions, and those interested in the preparation of sections of vegetable structures will do well to procure one of them. We have tried this form of section-cutter, and find it much more manageable than the old-fashioned one with the screw. The great secret of the success of the present instrument is the elevation of the material to be cut by percussion. This at once overcomes the "drag" upon the cork, which the screw often fails to do until it has been turned more than is necessary, and we get a section either too thick or unequal. The sections cut by Mr. White are certainly far superior to any we have seen before. A further advantage which most microscopists will appreciate is that the price is not above a third of that usually charged for the screw instrument. With the instrument he sends a few practical directions for its use.—*F. K.*

Saccharo-Polariscope.—If F. Kitton had constructed and tried his "Saccharo-Polariscope" (figs. 62 and 63, page 104, in your May number), he would have found he had made a very important mistake in using a tube with a round bottom or test-tube form, which, acting as a plano-convex lens, would prevent any light reaching the eye. This of course is seen at a glance by any one at all acquainted with optics, but not so readily by young people who very laudably try to make apparatus for themselves. I need scarcely say the bottom of the tube should be ground off, and a disc of thin "patent

plate" cemented on with marine glue or other substance.—*W. L.*

Blood Crystals.—After having made a slide of the blood-corpuscles of a blind-worm (*Anguis fragilis*), I observed in a day or two that some crystals had formed. They had congregated together in the form of crosses, stars, &c. There was no single crystal by itself. They came naturally by themselves, without any artificial means on my part. Can any of your readers inform me if this is a common occurrence?—*E. G. S.*

ZOOLOGY.

Zonites glaber (Studer).—I have pleasure in recording a fresh locality for this beautiful little shell, so recently added to our fauna by Mr. Rogers, of Manchester. Mr. S. Tuke and myself took several specimens on the 30th ult., in woods near Hitchin, where it is found under long damp moss, associated with *Z. alliarius*, *Z. nitidulus*, and *Z. cellarius*. The shells taken are much darker than specimens I have received from Cheshire, being of a reddish-brown colour and extremely glossy. *Zonites glaber* has evidently a wide range in this country, and it seems strange that so conspicuous a shell should have remained so long unknown. Those who are interested in our land shells should look for it in their various localities, and record their observations in Science-Gossip. It does not appear to be confined to any particular geological formation, having been taken near Manchester, Doncaster, Plymouth, and Hitchin,—sometimes under stones, sometimes under moss, or among moist dead leaves in woods. Its distinctive characteristics are thus pointed out by Mr. Jeffreys:—"This shell is three times the size of that of its nearest congener, *Z. alliarius*, and is of a reddish-brown or waxy colour; the whorls are more convex or swollen, the lower part of the shell is not so much arched, the mouth is larger, the umbilicus is smaller and narrower, and the colour underneath is sometimes whitish." Animal, "dark bluish-grey, striped like a zebra on each side in front, and irregularly mottled behind." It sometimes emits a slight smell of garlic.—*C. Ashford, Tottenham.*

Shape of the Nucleus of the Red Blood-Corpuscles of Pyrenæmatous Vertebrates.—Mr. Gulliver, F.R.S., exhibited at the last meeting of the East Kent Natural History Society, specimens of the red blood-corpuscles of birds, in order to show that the nucleus is regularly an ellipse, the length of which is from twice to thrice its breath. This demonstration, though long ago made by him, seemed to demand new examination, since the German histologists and their disciples are now citing birds as an example of a class in which this nucleus "is more or less circular." The results of the new observations by Mr. Gulliver prove the general accuracy of his former ones, published upwards of a quarter of a century since; and the only explanation of the German error seems to be that the physiologist (A. Rollett, in Stricker's "Human and Comparative Histology") had confined his observations to the blood of the common domestic fowl. In this bird, curiously enough, as long before proved, the nucleus differs, in being merely suboval, from that of the class generally, in which the nucleus is a more elongated ellipse than that of the entire envelope, or than is to be found elsewhere in the corresponding nucleus throughout the vertebrate sub-kingdom.

Myriotrochus.—Can any of your readers inform me where *Myriotrochus Rinkii*, one of the Holothuriads allied to *Synapta*, lives, and what are the best means to take to obtain the wheel-like spicules?—*G.*

New Species of Frogs.—Dr. Günther has described, in the May number of the *Annals and Magazine of Natural History*, two new species of frogs from Australia. The first also belongs to a new genus, named *Notaden Bennetii*. It comes from the Castlereagh River, and Dr. Günther describes it as very remarkable. The second species is *Chiroleptes platycephalus*, from Port Bourke.

The "Challenger" Expedition.—Professor Wyville Thompson has just sent another communication to *Nature*. A new *Gephyrean* was dredged up off the island of Teneriffe, on which Dr. Willemoes Suhm, proposes to establish the genus *Leiderma*, which will represent a family intermediate between the Sipunculids and Priapulids. Off the island of Ferro, another dredge was made at a depth of 2,200 fathoms, and attached to the branches of a dead coral were found several specimens of a magnificent sponge, belonging to the Hexactinellidæ. One specimen, consisting of two individuals united together by their bases, was about sixty centimetres across, and had very much the appearance of a large example of "tinder fungus" attached to the trunk of a tree. Both surfaces of the sponge were covered with a delicate net-work of square meshes, closely resembling that of *Hyalonema*, and formed by spicules of almost the same patterns. The sponge was bordered by a fringe of fine spicules, and from the base a large brush of strong, glassy, anchoring spicules project, fixing it to its place of attachment. The form of the barbed end of the anchoring spicules is as yet unique among sponges. The sponge, when brought up, was of a delicate cream-colour. A number of small examples of this sponge, some of them not much beyond the condition of gemmules, were also brought up, so that the naturalists will have an opportunity of studying

the earlier stages of its development. The sponge forms the type of a new genus, and Professor Thomson proposes to call it *Poliopogon amadou.* A dredging 500 miles south-west of Teneriffe, with 3,400 fathoms of line, brought up yellowish ooze, in which were found several small living mollusca, belonging to the genera *Arca*, *Limopsis*, and *Leda*, as well as two new bryozoans. Foraminifera were abundant, as well as some beautiful radiolarians. The Professor mentions another dredging, in which he was greatly interested, when 3,600 fathoms of rope were paid out. The dredge was out eight hours, and brought up about one cwt. of red clay. This was the deepest, by several hundred fathoms, that had yet been made. It was singularly poor in organisms, and from its absence of foraminifera, only three or four being found of the cristellarian series, the Professor attributes this peculiar red deposit to the movement of water from some special locality, very possibly the mouths of the great South American rivers.

Provincial Natural History Societies.—The programme of the Leeds Naturalists' Field Club for the quarter April to June, shows that alternately with "exhibition of specimens and conversation," which takes place once a fortnight, papers on subjects on scientific interest are to be read. Excursions also take place on an average once a fortnight, the first object of the Club being "the minute investigation of the natural history, in all its branches, of the immediate neighbourhood of Leeds, and a more general investigation of the whole of the West Riding." This Society was founded in 1870, and was reorganized on a broader basis in March, 1872, and seems to be doing good work.

BOTANY.

Variation of Size among Certain Trees.—At a recent meeting of the Philadelphia Academy of Natural Sciences, Mr. Thomas Meehan dwelt upon the remarkable manner with which certain dwarf trees assumed arboreal proportions when removed to other habitats. For instsnce, *Quercus prinoides* seldom grew more than two feet in height. It was one of the smallest of shrubs. In his collections in Kansas, he found oaks in the vicinity of Leavenworth, which made small trees from ten to fifteen feet high, and with stems from one to two feet in circumference. He was entirely satisfied that it is identical in every respect but size with the *Q. prinoides* of the Eastern States. Among trees there are few which produce forms as low shrubs; but the *Pinus Banksiana*, in the East but a bush of five or ten feet, grew often forty feet along the shores of Lake Superior; the *Castanea pumila*, Chinquapin chestnut, when it gets out of the sands of New Jersey into the clayey soils west of the Delaware, often grew as large as many full-grown apple-trees; while the *Celtis occidentalis*, which in the East is generally but a straggling bush along fence corners, is in Ohio a large spreading tree with enormous trunk, and in Indiana is as lofty and as raceful as an elm.

Are Oak-galls False Acorns?—Mr. Newman, in a recent paper upon galls, in the *Entomologist*, propounds the theory that these singular objects come as near to the true acorn as the tree can make them, the oak being unwilling to be diverted from its legitimate aim of producing good fruit. Two opposing forces meet; the gall-insect, in its endeavour to develop suitable nutriment for its kind, is more or less thwarted by the natural efforts of the tree. According to the amount of efficacy with which these are put forth, so is the result. Hence we meet with galls sometimes so fantastic and irregular in outline that they seem in no wise akin to the true acorn; in other instances we have galls, like that conjectured to be produced by *Cynips Kolleri*, where the exterior is scarcely to be distinguished from the true acorn, and each is surmounted by a style. The very common "artichoke gall" is a small representation of an acorn, seated amongst the scales of the involucre.—*J. R. S. C.*

Stapelia Europæa.—The Stapelias are generally considered as belonging solely to the southern hemisphere, natives of the Cape of Good Hope; one species, however, has been discovered at Oran, in Algeria, by Mr. Munby, a botanist, who was resident there for many years, and who gave it the name of *Boucerosia Munbiana.* I found it in the crevices of the high rocks at Santa Cruz, above the town of Oran, tolerably abundant, but not in flower, in the month of February. It is said by Mr. Munby, in his Catalogue of the Flora of Algeria, to be identical with the *Stapelia Europæa*, which is stated in Lindley's "Vegetable Kingdom" to be found in Sicily, and in the Tourist's Flora of Woods as at "Lopadusa, with stems short, square, smooth; flowers fasciculate, filaments quite simple, with two glands, ss. 7, 11." Through some mistake, as Mr. Munby informed me, it was incorrectly figured in a French publication of the flora of Algeria, but that a perfectly correct figure is given in his catalogue. I gave several live plants to Mons. De Notaris, of Genoa, Mons. Moris, of Turin, and one to the late Sir Wm. Hooker, all of whom were glad to accept them, as the only species found in the northern hemisphere and but recently discovered. I have not by me at present the Flora of Sicily of Gussone, but suppose he has described it; the flower is very insignificant, bearing in appearance no resemblance to those of the Cape.—*T. B. W.*

Asphodels.—On a rocky plain a little above the locality of the Stapelia, is found the *Asphodellus*

acaulis, an elegant little plant without scape or stem, the flower-stalk rising direct from the crown of the root, like the common primrose; the flowers are numerous and large, of a delicate orange and white colour, the flower-stalks about three inches high. I gave some live plants to the Professor of Botany at Montpellier, also to the late Sir Wm. Hooker, who was previously unacquainted with it; nor was it known as a living plant in Paris. The well-known garden species, *Asphodellus albus*, is abundant about Oran, rising to the height of three or four feet. From the fasciculated roots, consisting of large fleshy tubers, is extracted an alcohol by the colonists, and sold under the name of *trois six d'Asphodel.* Both the *A. albus* and *ramosus* are natives of Europe, and one of them I have seen covering an entire field on the road between Cività Vecchia and Rome: both (or one of them) are very abundant at Palermo, Sicily.—*T.B.W.*

PREPARING CHARÆ FOR THE HERBARIUM.—The calcareous encrusted *Charæ* make wretched herbarium specimens, as is well known, being not only unsightly, but usually also very fragile. M. Corum remedies this by plunging the fresh specimens for a short time in water containing one per cent. of hydrochloric acid, and afterwards washing in pure water. Their aspect, when thus prepared and dried, is nearly that of the living plant.

THE BABYLONIAN WILLOWS.—A writer in *Silliman's American Journal* says that from the investigations of Karl Koch, it appears that the "Garab," upon which, according to the psalmist, the captive Jews at Babylon hung their harps, is not the "Weeping Willow," named *Salix Babylonica* by Linnæus on account of the current tradition; and indeed, is not a willow at all, but a poplar. Ranwolf had long ago concluded that the tree was not a willow. The *Salix Babylonica*, whose hardiness indicates a cooler climate than that of Mesopotamia, is now regarded as of Chinese or Japanese origin; so that its specific Linnæan name gives place to that of *Salix pendula*, Mœnch.

SENECIO SQUALIDUS.—Though this Ragwort is so rare that its only recorded stations in Britain are Oxford and Bideford, it grows rather plentifully on the walls of the passage on the north side of the Cathedral library. Why this species should have been called *squalidus* might well be questioned, for it is really so gay and elegant, and has such a lasting and profuse bloom, as to be well worth attention for the adornment of rock-work and the Cathedral precincts, for which very likely this Ragwort has been planted. But Mr. Gulliver, when quartered with his regiment at Canterbury, about a quarter of a century ago, saw *Senecio squalidus* growing on the city walls, where it has not been found of late years. The pollen-grains are oval, muricated, and about 1-800th of an inch long, and 1-1143rd broad, which is much smaller than those of *Petasites fragrans*; and in both they show three scars, with the extruding tubes, when treated with sulphuric acid. The Canterbury Senecio is quite glabrous, and so is the ovary, and the plant is nearly, if not wholly, inodorous. Thus it differs from Professor Babington's description of the "fruit silky," from the figure 600 of "English Botany," and its text, which says, "the whole plant smells strongly, somewhat like wormwood." These are characters that perhaps vary; and specimens having been sent to Mr. Edgeworth, he agrees with Mr. Gulliver's determination of the species as *Senecio squalidus.* Seeing the beauty and rarity of this plant, it is perhaps not too much to hope that it may be carefully preserved by the Cathedral authorities, otherwise, as soon as it becomes generally known, it will fall a prey to the ruthless cupidity of collectors, and indeed may be destroyed in the usual "tidying up and setting to rights" by ignorant labourers.—*G.* [This plant is very abundant at Eaton, near Norwich, whither it was brought many years ago by the late Mr. Ewing from Bristol. It has since spread over a considerable area.—ED. S. G.]

CRYSTAL PRISMS IN THE OVARY OF COMPOSITÆ.—This plant is further interesting as containing, in the ovar or its coat, those small crystal prisms which were figured in different members of the order in SCIENCE-GOSSIP of last month. In this species the prisms are about 1-1000th of an inch long, and 1-6400th thick. They seem entirely to have escaped discovery by previous observers, though, as shown in GOSSIP, sometimes affording good characters to systematic botany.

HIEROCHLOE BOREALIS.—There seems to be a considerable difference of opinion amongst writers on Botany as to the time of flowering of the Northern Holy Grass (*Hierochloe borealis*). Most authors say May and June; Sowerby and Babington, July; Syme, that specimens from Thurso flowered in his garden in April. I have plants of this grass in my garden from the same place, the flower-buds on which were perfectly formed by the middle of April this year, and fully expanded at the beginning of May. I think, therefore, it is a mistake to say that it flowers in July, even in its native habitat. It sends up too, its barren shoots early in spring, and not in late summer or autumn. It seems to be a grass of small agricultural value, though it increases very fast from its running roots. I have several living plants which I should be glad to exchange for other varieties.—*R. W. Westward, Wigton.*

THE HOLLY FERN (*Polystichum lonchitis*) is by our usual authorities asserted to be be found only in mountainous districts of Wales, Scotland, and Ireland, and very rarely in the north of England.

A few days ago, I saw, in Brockley Combe, Somersetshire, about two miles from Nailsea, some hundred plants of this neat and uncommon plant. I gathered some fronds, specimens of which I send. One plant had the fronds re-divided at the apex. I believe that this is the first time this fern has been met with south of Yorkshire, and Somersetshire to be the fourth English county in which it has been seen. *Cystopteris fragilis*, I found on an old wall close at hand, and on another wall at Cleeve Foot, a few miles distant.—*Nathaniel Evan Davies, Lewesfell, Clevedon.*

GEOLOGY.

Antiquity of Man in America.—An esteemed American correspondent of Science-Gossip, Dr. Charles C. Abbott, has recently discovered in the river drift at Trenton, New Jersey, in gravel at a great depth, and beneath undisturbed layers of fine sand, three chipped implements, of unquestionably human manufacture, lying close to each other. One has a knife-like form, 9 in. long, made of a reddish-brown stone, compact, laminated, and susceptible of a high polish. The other two bear a considerable resemblance to common European forms: one is of opaque yellowish quartz, 5¼ in. long, and 1½ in. in greatest width, the other is a flake of sandstone rock, 6½ in. long, 3½ in. wide. From the occurrence of such specimens so near each other, Dr. Abbott thinks that we must admit that the antiquity of American man is greater than the advent of the so-called "Indian period."

Discovery of Elephant Bones in a Staffordshire Cave.—At a recent meeting of the Manchester Geological Society, a paper was read by Mr. John Aitken, F.G.S., on an ossiferous cavern recently discovered in the carboniferous limestone in Staffordshire. Mr. Aitken said the cavern in question was to be seen in a rock at Waterhouses, on the bank of the river Hamps, in Staffordshire, and was exposed in a quarry of limestone at Bank End, belonging to Mr. Charles Braddock. It was discovered about eight years ago, when a quantity of rock having been let down in conducting the operations of the quarry, the presence of a number of bones was revealed among the foreign material, which, upon examination, were found to have been derived from a blocked-up subterranean channel which had been excavated. The bones appeared to be part of the remains of an elephant, several teeth, and portions of the tusk of the animal being amongst them. Most of them had been squandered, but Mr. Brockbank, of Manchester, was fortunate enough to secure a considerable number. Mr. Aitken visited the spot a short time ago, but was too late to obtain more than a few fragments of the tusk. Since the date of the first discovery not much progress had been made in that part of the quarry until very recently, when a body of rock was again displaced, bringing down with it the included accumulations of the rock cavity, and exhibiting a section of the cavern five or six feet in advance of the former exposure. On this occasion another lot of bones were brought to light, quite a wheelbarrowful being collected, comprising the pelvis, vertebræ, leg and toe bones, ribs, and a jaw, in which were inclosed a number of teeth, together with about twelve or fourteen detached teeth, and numerous other bones. The leg bones and several others were large and massive, the former having a diameter equal to that of a man's wrist. The teeth appeared to have belonged to a young ruminant animal, much smaller than the size of the other bones would indicate.

The Origin of Permian Breccias.—At a recent meeting of the Geological Society of London, Professor Hull described certain breccias occurring in the vicinity of Armagh, which he referred, both on stratiographical and physical grounds, to the Lower Permian series, considering them to be identical with the "brockram" of Cumberland and the breccias of Worcestershire and Shropshire. The lower beds rest on the denuded surface of the Lower Carboniferous Limestone, and consist of a breccia of limestone pebbles in a reddish sandy paste, sometimes becoming a bedded calcareous sandstone with pebbles. These beds, which are 10–12 feet thick, are overlain by soft rudely stratified conglomerate and boulder-beds, of subangular and rounded blocks of grit, felspathic sandstone, vein quartz, and limestone. In some places the breccia graduates up into the overlying boulder-beds, but sometimes its surface is eroded. These beds are overlain by boulder-clay of the Drift period. Within the city of Armagh well-borings, &c., have revealed the existence of New Red Sandstone above the breccia and boulder-beds. In Professor Hull's opinion the only agent which could have brought the blocks of Silurian and Old Red Sandstone age found in the boulder-beds from their place of origin is floating ice. Professor Hull further referred to the extensive denudation which the carboniferous beds have undergone in Armagh, and also alluded to the occurrence of beds of Permian age near Benburb, between Armagh and Dungannon.

NOTES AND QUERIES.

Kingfisher's Nest.—On the 23rd of April, 1873, I had the pleasure of finding a kingfisher's nest containing seven eggs. Of course, according to the Small Birds' Protection Act, I did not disturb it. It was constructed of fish-bones, scales, fleas, lice, &c. As it was in Cheshire, where the kingfishers' nests are not common, I thought I would note the occurrence.—*P. A.*

The Camberwell Beauty.—A young lady caught on Easter Tuesday (April 15th) a *V. Antiopa*, which she kindly gave to me. What makes this incident more remarkable is, that it was captured on a window-sill almost in the heart of London, viz., near Finsbury Square.—*E. Matthews.*

White Oxlip.—In case of its interesting any of your botanical readers, I beg to inform you that last spring, being in Sussex, I found a white primrose, which at the time I took to be of the oxlip type, two of the flowers being joined low down near the root by their stalks. I planted it in my garden here, and this year it has developed into a regular white oxlip. White primroses are, I know, not uncommon, but I have never seen a white oxlip. —*Windsor Hambrough.*

Œnanthe crocata (pp. 93, 118).—There is good authority for calling the root of this very poisonous plant "sweet." Mr. Worthington Smith, in some remarks on a case of death of a man and cart-horse from eating the roots of Œnanthe (*Nature*, vol. i. p. 356), goes on to say: "You remark, 'it seems strange that the horse as well as the man should not have rejected a plant of so acrid and suspicious a flavour.' Now the flavour of the *root* of this plant is known to be mild and pleasant, and not acrid. I can confirm the truth of its mild taste from experience, as I have twice eaten portions of the root for experiment: the taste is intermediate between that of a turnip and the stalk of celery." This is pretty much what we should call "sweet." The *smell* of the root, however, is certainly, judging from my own experience, rather overpowering; but the *dura messorum ilia* are not generally accompanied by too highly developed olfactory nerves. I may add, from the same source, that Professor Christison found that plants gathered in certain localities were harmless, while others from different places were highly poisonous.—*R. A. Pryor.*

Beautiful Fish.—Fish of every shape and colour were swimming lazily in and out of the black-looking caves and fissures, or coasting round under the overhanging edges of the coral precipices; some of the finest cobalt-blue, some golden, some pink, some more like beautiful orange and purple butterflies than natives of the sea, with long white rat-tails, swimming or floating frontways, stern-ways, side-ways, with apparently equal ease and partiality; some variegated like harlequins; many, not with their hues more or less blending into each other where they meet, like Christian fishes, but mathematically divided by regular distinct lines, as if they had paid for their colours and had them laid on by the square inch.—"*South-Sea Bubbles,*" *by the Earl and the Doctor.*

Something like Gnats.—"The gnats in America (says Mouffet) do so plash and cut that they will pierce through very thick clothing, so that it is excellent sport to behold how ridiculously the barbarous people, when they are bitten, will strip and frisk and slap with their hands their shoulders, arms, and sides, even as a carter doth his horse." Weld tells us that these insects were "so powerful and bloodthirsty that they actually pierced through General Washington's boots!" This does not appear very credible, though Mouffet says, "In Italy, near the Po, great store, and very great ones, are to be seen, terrible for biting and venomous, piercing through a thrice-double stocking and boots likewise, sometimes leaving behind them impoysoned, hard, blue tumours, sometimes painful bladders, sometimes itching pimples, such as Hippocrates hath observed in his Epidemics in the body of one Cyrus, a fuller, being frantic."—*Rennie,* "*Insect Miscellanies.*"

"With man has commenced a new cycle of existence, mental and moral, intended to progress *ad infinitum.* One creation, the physical, has graduated into another, the intellectual, and the natural yearnings of the human soul are towards its higher stage of existence."—*Taylor's* "*Geology of Manchester.*"

"Osteology has special importance in comparison with the study of any other system, inasmuch as large numbers of animals, all in fact of those not at present existing on the earth, can be known to us by little else than the form of their bones."—*Flower's* "*Introduction to the Osteology of the Mammalia.*"

New Insect Net (page 32).—If one may venture to criticise an article which one has not tried experimentally, I would remark that an objection to the new net is to be found in the fact that it cannot conveniently be taken to pieces when not in use. No doubt, the proposed construction gives increased security, but some entomologists decidedly object to exhibit their implements to the public gaze. By no means, however, can it be said to be too small, since one of much less dimensions is frequently most excellent for working along the hedge-rows and wood-ridings for geometræ. But on the question of weight, again, I am not sure that too light a net is good, because a certain amount of weight in the ring gives a greater degree of steadiness to the stroke. This is, at least, the experience of some insect-hunters who are very successful.—*J. R. S. C.*

Do Fishes move after Death?—Your correspondent "D. H. T." is not aware, perhaps, that some kinds of fishes are known to live very frequently for some considerable period when they are out of water. If he makes observations, he will doubtless find that the Goby is not the only fish that will be found gasping four days after it has been out of the water and apparently dead. He may rest assured that he was only apparently, and not actually dead. —*W. S. Palmer.*

Notes on the Siskin.—This bird, when kept in confinement, does not seem capable of the strong personal attachment which the goldfinch may be made to manifest, though it is not unlike it in some of its habits. Like the goldfinch, it is excessively fond of hemp, and will cram itself with that seed, if allowed to do so, until it returns from the crop. Also it is particularly timid when approached by strangers, and is even alarmed if those who are well known to it come near with any unusual garment, or wearing a hat, an article which seems to be particularly terrific to the siskin. The song of this bird, when caged, ceases, as usual, in the moulting season, but it is not immediately resumed; about the beginning of February it begins to utter a few low, occasional notes, coming into full song in March.—*J. R. S. C.*

How do Haddocks Spawn?—From my own knowledge, and from the statement of several fishmongers, they spawn in the usual way, male and female, roe and milt. The fact of the two being found in one fish *is not usual*, though there may be something in the locality which induces it, as the

exception seems to have been met with more than once. Mr. H. O. Sterland does not seem to have preserved the specimens, or to have mentioned the place where these curiosities are found.—*H. P. M.*

The Missel Thrush.—I should feel obliged if you could give me some little information about the Missel Thrush, *Turdus viscivorus*, Storm Cock, or as it is called in Derbyshire, Nottinghamshire, and indeed, I believe, all the Midland counties, the Thrice Cock. 1. Can you tell me why it is called Thrice Cock? I have looked in five or six Natural Histories,—Yarrell, Macgillivray, Pennant's, &c.,—but I can find no mention whatever of the name by which the bird is wholly known amongst the common people in Birmingham, Derbyshire, and many other places in this midland district. 2. Can you tell me if the name is to be found in print, and if so, in what book?—*R. R. R.*

Ipswich Amber.—I have never met with this production; but some years back, when Hunstanton (on the Norfolk coast) was comparatively inaccessible, the lighthouse-keeper on St. Edmund's Point was in the habit of selling amber that he professed to have gathered on the shore below after the storms of winter. There is no doubt that the substance was what it claimed to be, and I know of no reason for questioning the veracity of the finder. Jet also occurred in some quantity.—*R. A. Pryor.*

Botanical Record Club.—It is difficult to understand what object the promoters of the proposed "Botanical Locality Record Club" can have. That such a scheme can in any way advance the real interests of botanical science would be hard to prove. So far as the prospectus attempts to set forth any such advantage, the only plea made is for a "fuller exemplification of the geographical and geological distribution of British plants." Surely Sowerby and Hooker and others have given us information enough on this subject. Mr. Blow says, "the use of such a society is obvious." To this I would rejoin, that the abuse of the facilities offered by such a society are far more obvious. What would the inevitable result be, but that in two or three years' time the choicest rarities of our island flora would be "recorded" off the face of the earth. The growing fashion, or passion, for collecting is yearly becoming a greater evil. Real working botanists can always obtain the information they require, a happy freemasonry among them insuring that courteous interchange of "hints" which they know will not be abused. Some such protection is needed for the preservation of our rarer plants in these days of universal inquisitorial Vandalism. For who are they that will be first to profit by the publication of a list of *habitats?* I answer, not botanists, properly so called,—not *bonâ fide* students, but a far more numerous posse of "amateur collectors" and curiosity-mongers, who, with no reverence for the sacredness of the species in its solitary haunt, will assuredly watch their opportunity for transporting in into their obscure herbaria, or, may be, transplanting it entire into their "rustic rockeries" at home. The modern rage for fern-cultivation has given rise to such a profitable "demand" for rare species, that many localities, long famous for one or another, are now stripped. I know of one gardener who sent an agent to Killarney to secure all the *Trichomanes* he could find; another, who transplanted the whole of *Asplenium septentrionale* from one of its best localities in Cumberland; another, at Scarborough, who pointed me with pride to a large plot of *Lastrea fœnisecii* in his garden, with the assurance that his "young man" had secured all the plants in the once famed habitat for this local species, so that he was now sole agent for it, and would be most happy to sell me one for eighteen pence. If botanists have the folly to expose, Hezekiah-like, their treasures to the eyes of such people, we shall no doubt soon have the rapacious hordes of the Babylonians upon us. For my part, I protest against opening the gates to the invader.—*Ed. Atkinson, F.L.S., F.Z.S.*

Poisonous Plants at Chester.—In your last number, Eliz. Edwards asks the name of the plant which was eaten by some boys from the Chester Workhouse in the early part of last summer, and caused the death of two of their number! It was *Œnanthe crocata*, but was erroneously described at the inquest as Water Hemlock; and one of our local papers in reporting the case gave the scientific name of that plant, *Cicuta virosa*. *Œnanthe crocata* grows very freely on the river-side where the boys gathered it, and was mistaken by them for wild celery, which grows in company with it. Six boys ate of the tuberous roots; two died within twenty-four hours, and the other four, who had eaten very little, recovered. *Cicuta virosa* is not to be found in our neighbourhood.—*J. D. S., Chester.*

Forcing Pupæ.—I think Mr. Anderson (Science-Gossip, April, 1873, p. 93), must have been in too great a hurry with his pupæ, and subjected them to too great a heat. I have sometimes tried forcing them forward, and by carefully increasing the heat by slow degrees each day, imitating as far as possible the gradual advance of warm weather in the spring of the year, have been fairly successful, though I do not know that I got so many out as I would have done by letting them alone. Once, however, in my very early days, when even *Pieris brassicæ* was worth breeding, I had a lot of pupæ of this species laid out on the mantel-piece of a room where my breeding-cages, &c., were kept, and where a fire was seldom lighted. They had lain there some time, and one night about Christmas the fire was lighted. It soon burnt up hot, heating the stone shelf above, and thinking it too warm for my pupæ, was about to remove them, when I noticed the wing-markings shining through the pupa-case, as they do just before the insect comes out. I watched them, and in a few minutes one emerged, and within two hours of the fire being lighted, they were all out in fine condition. I knew too little then to take notice of anything further than the simple fact, but I have never seen a similar thing since, though I have often tried with common things.—*John E. Robson, Hartlepool.*

The Oldest Trees.—In answer to a correspondent who inquires whether any of your readers can acquaint him as to which is the oldest tree in Great Britain, I beg to send the following:—So far as I have been able to learn, after a good deal of observation, the oldest tree now in this island is an old oak tree about seven miles from Mansfield, in Nottinghamshire; it is within half a mile of a large forest called Birkland, which is of vast extent, and is the centre of the celebrated district called the "Dukeries." The tree is now fast going to decay, and unquestionably would long since have succumbed to the force of the elements had it not been for the extreme care taken of it by his Grace the

Duke of Portland. The tree is quite historic; the traditions concerning it numerous, but by far the most interesting is that which has given it its *present* name of the "Parliament Oak,"—the tradition being that Edward I. held a parliament of his barons under its broad shade in 1297, previous to his campaign into Scotland. At the present time its trunk, though split into three or four parts, is held together by large and massive bands of iron, and its sole remaining branch is supported by various props and girders. As this tree is well authenticated in the County Histories, and as it must, supposing the tradition to be true, have been a splendid tree in 1297, it can scarcely be under nine centuries old. In the forest of Birkland, no doubt part of "Merrie Sherwood," there is another really majestic tree called the "Major Oak," not less than forty-four feet in girth. It stands in a splendid position and is seen to great advantage; it is without exception the most magnificent specimen I have ever seen. There is a very large one in Boconnoe Park, Cornwall, but the age is not known. I shall be very glad if others will take notice of your correspondent's inquiry, and afford all the information they can in answer to his query.—*Rev. W. Mardon Beeby.*

Southern Birds.—Can any one name five birds of the Southern Ocean for me from the following incomplete description, beyond which I have no information? 1. A large brown bird, called by the sailors "stink-pot." 2. "Parson-birds," with white marks upon their faces. 3. "Ice-birds," beautiful little creatures, slightly larger than Mother Carey's Chickens, with delicate silvery grey plumage. 4. "Molly Manks," nearly as large as albatrosses, with white bodies and dark wings. 5. "Whale birds," about twice as large as storm-petrels, with white bodies and dark wings.—*H. G.*

Pain in Animals.—I concur with my friend Mr. Lefroy that the mesmeric faculty with which predaceous animals are endowed has the effect of annihilating pain, so long as the spell remains unbroken. At the same time I cannot but think they are indued with it more for the purpose of securing their prey than for suspending pain. I know an instance in which a lady used to be mesmerized by her servant while her teeth were extracted, and although they were firmly fixed, she declares she experienced no pain whatever during the operations. Knowing this, I think we may justly infer that mesmerism—or fascination, as it is sometimes termed,—produces a like result upon animals of lower organization than man. What leads me to think that the faculty of fascination is given to animals mostly for predatory purposes is, that they only occasionally exercise it, and when it is a matter of difficulty for them to secure their victims by any other means. If this be the case, what can do away with pain when fascination is not exercised? I believe that the extreme terror which the frightful aspect of animals incites in their prey has the effect of producing anæsthesia, and that this even holds good with respect to man if the subject is sufficiently terrible. It has been remarked that men, when once in the grasp of wild beasts, invariably become stupefied. Our eminent African explorer, Dr. Livingstone, was once attacked by a lion, and thus he describes the event:—"Starting and looking half round, I saw the lion just in the act of springing on me. I was upon a little height; he caught my shoulder as he sprang, and we both came to the ground below together. Growling horribly close to my ear, he shook me as a terrier-dog does a rat. The shock produced a stupor similar to that which seems to be felt by a mouse after the first shake of the cat. It caused a sort of dreaminess, *in which there was no sense of pain or feeling of terror*, though I was quite conscious of all that was happening. It was like what patients partially under the influence of chloroform describe, who see all the operation, but feel not the knife. This singular condition was not the result of any mental process. The shake annihilated fear, and allowed no sense of horror in looking round at the beast. This peculiar state is probably produced in all animals killed by the carnivora; and, if so, is a merciful provision by our benevolent Creator for lessening the pain of death." Dr. Livingstone was rescued by a Hottentot servant, who fired upon the lion. There is extant a similar anecdote in which it is related that an officer in the Indian army, being seized by a lion, instantly experienced a kind of drowsiness, but no pain. Fortunately the lion, having carried him a short distance, deposited him unhurt on the ground and went away. He was thus spared to recount his most remarkable adventure, which he did very minutely, describing his sensations while he was in the brute's mouth. It would have been interesting to have quoted his words, but not knowing in what book I met with the case, I cannot lay my hands upon it now. I am certainly of opinion that fear is the chief destroyer of pain. This is a matter which deserves much attention, and many thanks are due to Mr. Lefroy for having brought it under consideration. It would be highly interesting to hear the opinions of our scientific gossipers on the subject.—*H. A. Auld.*

Larvæ and Ichneumons.—On August 4th, a few years ago, I put an apparently full-grown caterpillar of the large Garden White butterfly (*Pieris brassicæ*) into a glass jar, expecting soon to see it changed into a chrysalis. On the following morning, however, it was to all appearances dead, with a number of small yellow cocoons spun around its body. Judge of my astonishment when, on the 10th of the same month, on taking it out of the jar, I found it still living, though quite shrivelled up! Another caterpillar of this same species had no fewer than twenty-one cocoons of the same ichneumon spun upon and around it.—*C. Robson, Newcastle-on-Tyne.*

Do Queen Bees Sting?—I should like to inform Mr. Carr, whom I know by report to be an extensive Lancashire bee-master, that queen bees can and will sting human subjects. Does he not himself state the fact that in combats betwixt rival queens he has repeatedly seen them sting; therefore does not this clearly prove their power to sting, although I confess it is but seldom exercised, because probably, like the ordinary worker bees, they lose their life by exercising this power, especially so if at the same time they suffer the loss of their sting. I should be happy to correspond with Mr. Carr upon this, or any other subject connected with apiculture.—*J. T. R.*

The Origin of the Microscope.—Would you kindly endeavour, in your next Science-Gossip, to tell me where I can find an account of Demisianus, the suggested inventor of the microscope mentioned by Quekett in his work on the microscope? By noticing this, you will greatly oblige a constant reader.—*T. F.*

NOTICES TO CORRESPONDENTS.

W. S. Thomas.—You will see by referring to the terms under which we insert Exchanges *gratis*, that we cannot allow more than three lines. Your exchange would make nearly a dozen!

T. C. M.—The published price of Kinahan's "Handy-book of Rock-names" is 4s. It may be obtained of Hardwicke, 192, Piccadilly.

G. S. S.—You cannot do better than get Nicholson's "Introductory Text-book to Zoology," where you will find the subjects mentioned, treated under their several heads. "Half-hours by the Sea-side" (London, Hardwicke) will also help you to an elementary knowledge of all you name.

T. W. Harris, Jun.—We have no doubt you could obtain the eggs, &c. of the *Ailanthus* from Mr. S. H. Gaskell, Edgely, Stockport. See advertisement in May number of Science-Gossip.

A. Smyth.—We do not think it possible for the larva of any insect to remain in the human stomach, especially for the long periods usually assigned to such supposed cases.

F. C. B.—Your specimen is the tufted Water Forget-me-not (*Myosotis cæspitosa*).

A Subscriber.—*Anacharis alsinastrum* is so common in the dykes and rivers of the Eastern counties as to be a great nuisance. *Chara vulgaris* is tolerably common in the same localities, in the shallow bog-pools on commons.

W. H. S.—The insects are the Four-spotted Ladybirds (*Coccinella quadripunctata*).

M. A. H.—1. Plumstead Wood still exists; it is very near the Plumstead station on the North Kent Railway. 2. "British Conchology," by J. Gwyn Jeffreys; Tate's "Land and Fresh-water Mollusca" (Hardwicke, Piccadilly). 3. We do not undertake to return specimens sent to be named.

J. F. Baulch.—You may prevent spiders' eggs from hatching by placing them in an oven, or in hot water, spirits of wine, or carbolic acid, but if preserved dry they will shrivel. Possibly you may be able to preserve them in small glass tubes of dilute carbolic acid or spirits of wine. You can obtain entomological appliances from T. Cooke, 513, New Oxford-street, London, or any professional naturalist.—Rye's "British Beetles," price 10s. 6d.

J. H. E.—The insects are *Aradus depressus* (2 perfect, 1 pupa), order Hemiptera, commonly known as "bugs." The "rat-tailed larva" is probably that of a species of *Helophilus*. There are many species. These larvæ feed in damp and muddy places, and in vegetable detritus; hence the one in question was in a suitable place.—J. W. D.

Clifton Simmonds.—Your description of the caterpillars is too vague to indicate to what *order* of insects they belong. Possibly they may be *Cossus ligniperda* (the Goat-moth) half grown, but the crimson stripe halfway down the *side* does not agree with that species. Can you send a specimen?—C. G. B.

E. R. wishes to know if there is a Geological Society in South London, and if so, desires particulars of it. Perhaps some of our readers can give the information.

K. W.—Withering's "British Botany" is the best handbook of the British Flora arranged on the old Linnæan system.

A. G. Weld.—The eggs are commonly known as "Fairies' Bracelets," and are those of the Ground Lackey (*Lasiocampa Neustria*).

R. S.—We should think that Hooker's Flora is too advanced a book for you at present. Masters' "Botany for Beginners," and Balfour's "Elementary Botany," or Professor Oliver's "Elementary Botany" would be better. Get Mrs. Lankester's "Wild Flowers worth Notice," London, Hardwicke.

H. L. Kay.—The geranium leaf sent is really two leaves that have been united along the lower edges. For a scientific explanation of this and similar phenomena see Dr. Masters' "Vegetable Teratology."

J. P. G.—Your specimens were the eggs of the Emperor Moth (*Saturnia carpini*). The caterpillars have come out since the parcel arrived.

J. W. D.—The specimen is the leaf and catkin of the Goat-willow (*Salix caprea*).

A. W. Field.—Your specimen is one of the suctorial worms (*Trematoda*), or "Flukes," as they are commonly called. They are parasitic in fishes and birds, but the commonest is that inhabiting the livers of sheep.

F. G. Mellish.—Your plant is a hardy plant imported into this country many years ago from Siberia. It is called *Dielytra spectabilis*.

W. O.—We always endeavour to insert answers to queries in the order of priority. You have no idea of the correspondence which often takes place before some specimens can be named. Some of the most eminent naturalists of the day assist us, and we cannot do less than wait their own time in gratuitously naming specimens.

EXCHANGES.

Mountain Limestone Corals for Corals from any formation.—J. Hunter, Richmond, York.

For a piece of Vegetable Tissue, send stamped and directed box with good unmounted object to Wm. Sargent, Jun., Caverswall, Cheadle, Staffordshire.

Science-Gossip from commencement to present time, 101 numbers, clean, for Student's Microscope, or offers.—Fred. Stanley, Infirmary, Margate.

Well-mounted Slides offered for well-mounted examples of the following diatoms: *Meridion circulare, Lichenophora flabellata, Arachnoidiscus Ehrenbergii*.—W. Nash, Rowcroft, Stroud, Gloucestershire.

British Shells given for good specimens of British and European *Defrancias* and *Pleurotomas* (*Mangelias*).—Mr. M., Foxley Villa, Foxley-road, North Brixton, London, S.W.

Clausilia Rolphii for *Vertigo pusilla* and *Vertigo antivertigo*.—W. Nelson, Alma-place, Turner-street, Sparkbrook, Birmingham.

Wanted, good mounted Microscopic Objects for South Atlantic Dredgings, 2,850 fathoms.—T. C. Maggs, Yeovil.

Good Polariscope Objects—Brown and White Stearine, Palm-nut and Cocoa-nut Oils, Ozokerit or Erd-wachs, for other good slides.—R. H. Philip, Anlaby Road, Hull.

Foreign Shells for Fossils; lists given and required.—T. C. W., 45, Berkley-street, Liverpool.

Wanted, good specimens of Lepidoptera or preserved Larvæ for Bird's Eggs.—Send list to William W. Nutleton, Eyre-street, Batley.

Fossil Diatoms.—Well-mounted Slides for Diatomaceous material, or other Slides.—Thos. Lisle, Moorfields, Wolverhampton.

Good unmounted Micro. Objects offered for Embryo Oysters, uncleaned.—W. White, Litcham, Norfolk.

Wanted, living Specimens of *Lepidocyrtus curvicollis*. Good mounted objects in exchange.—E. H., 42, Grafton-road, Holloway.

For Pennywort Brand (*Puccinia umbilici*) send stamped envelope and unmounted object to J. P. Belmont, Dartmouth.

Good specimens of various Fungi, unmounted, for other objects of interest.—Address, Alpha, Messrs. Lynch & Bateman, 68, Market-street, Manchester.

British Birds' Eggs for Lepidoptera, also Sands from Alum Bay, Isle of Wight. List of birds' eggs sent on approval.—Mr. Thomas, Ray Lodge, Lingfield, East Grinstead.

Small pieces from cheek-bone of River Porpoise for other Microscopic objects.—C. C. Underwood, 25, Gloucester-place, Portman-square, London.

Z. glaber and *H. lamellata*, for *C. pisidioides, S. oblonga, G. maculosus*, or *L. gagates*, or varieties.—F. R. Stephenson, Salterhebble, Halifax.

Ceterach, *Osmunda, Asp. trichomanns, A. Ruta muraria*, and seedlings of *Adiantum assimile*, for Ferns of the limestone and alpine districts.—George Edey, Christchurch.

Wanted, living specimens of *Subularia aquatica* and *Isoetes palustris*, for other scarce British plants, &c.—David Mitchell, 2, Davy-court, Foundry-street, Halifax.

Diatom.—*Pinnularia radiosa*, mounted, for other good mounted objects.—John C. Hutcheson, 8, Lansdowne-crescent, Glasgow.

BOOKS RECEIVED.

"Familiar History of British Fishes." By Frank Buckland. London: Society for Promoting Christian Knowledge.

"Elementary Crystallography." By James B. Jordan. London: Thomas Murby.

"Comets' Tails no longer a Mystery." By J. A. R. London: Reeves & Co.

"Boston Journal of Chemistry."

"Les Mondes."

"The American Naturalist." April.

"The Astronomical Register." April.

"Monthly Microscopical Journal." May.

"Comptes Rendus, Société Entomologique de Belgique." No. 85.

"The Gold Yield of Nova Scotia." By J. A. Hetherington.

Reports of Eastbourne Nat. Hist. Soc.

Communications Received up to 14th ult.—R. B.—J. W. D.—S. W. M.—H. B.—J. P. G.—R. M. G.—J. S.—R. S.—J. P.—H. P. M.—C. F. G.—J. R. D.—J. H.—W. G.—P. A.—J. T. M.—J. R. S. C.—J. H.—T. C. M.—T. W. H.—R. H. P.—G. S. S.—H. J. G.—W. E. H.—W. N.—W. L. N.—A. W. F.—J. D. S.—T. C. W.—E. E. M.—E. A.—W. S., jun.—F. S.—R. J.—J. S. C.—R. A. P.—T. G.—W. S. T.—J. G.—H. L. K.—R. S.—A. de S. G.—H. M.—H. S. W.—W. B.—J. H.—C. A.—F. R. S.—J. T. M.—H. H. C.—W. L. H.—E. G. S.—C. G.—F. G. M.—J. F. R.—E. H. G.—W. L.—G. E.—R. W. W.—R. H.—N. E. D.—H. T. M., &c.

THE ORMER SHELL AND ITS INHABITANT.

By W. H. BOOTH.

MANIFOLD are the amusements open to the wanderer on the sea-shore; but of all these shell-collecting affords us the widest and most pleasing field for study. Only those who have devoted some time to this fascinating subject can imagine the infinite variety and multitude of the shells which inhabit our coasts. We lose, however, a great part of the enjoyment if we are not acquainted with the forms, shapes, and general habits of the creatures which inhabit those empty valves we see so plentifully strewing the shore.

With the view of giving some little information on the subject of the Ormer (*Haliotis tuberculata*) to the readers of SCIENCE-GOSSIP, I have taken up my pen to describe it to the best of my ability, trusting that this short paper may induce others to contribute short monographs on other species. The habitat of this species nearest to us is the island of Guernsey. It occurs pretty plentifully in all the Channel islands, but more especially so in the above-named island. Naturalists are very much divided in opinion as to whether this may be admitted to be a British species or not; but this point may have been settled by some of our eminent conchologists ere now. I see that it has been allowed a place in the native collection of the British Museum, and at all events it will not do us much harm if we allow it to take up its stand among our own collections of indigenous shells. Premising that the Ormer is a member of the class *Gasteropoda*, of the great division *Mollusca*, I will at once proceed to a description of the shell. As may be seen by reference to the illustration, it is rather a flat shell, having a series of apertures or openings in a row near the edge, and following the spiral curve. These apertures are very minute on the apex, gradually becoming larger as they approach the end of the shell. Although termed apertures, only a few (six or more) are open, the others being blocked up by the pearly substance of the interior of the shell. The outside is generally of a dusky hue, and variously coloured with red, brown, and here and there a few patches of green. In some specimens the red becomes somewhat brilliant, and more rarely we have bright green ones. This exterior is rendered rather rough by a large number of small ridges running down from the apex to the base, and about half a dozen transverse bands, which seem to be formed by the various additions to its habitation which the animal makes. That part of the shell which appears at the top of the engraving is exceedingly thick and strong: from this part it gradually gets thinner down to the edge, where it is about the thickness of an ordinary-sized common limpet. Hence its strength is somewhat considerable; but several marine animals are fond of boring into the outside, and so disfigure and weaken it. The apex of the whorl is extremely liable to get worn, when it appears shining like the interior, and it is somewhat rare to find a specimen not at all rubbed. Like the Limpets (*Patella*), whose near relation the Ormer is, it clings fast to the rocks, but only to those which are covered with the sea at ordinary low tides, thus being only procurable at spring tides. At first sight it may appear to be very different, and far removed from the Limpet; but further examination shows us a most beautiful gradation between the genera *Patella* and *Haliotis*. It may not be uninteresting to some readers to give some little thought and consideration to this gradation, which forms but a small part of that beautiful order and arrangement existing throughout the whole of the *Mollusca*. The first of our series, *Patella*, has a well-known and common representative in the common Limpet (*Patella vulgata*), which we everywhere meet with, clinging fast to the rocks on every portion of the beach, and without any aperture at all in its shell. The second is one very

similar to *Patella*, namely, *Fissurella*, our native representative of which, the Keyhole Limpet (*Fissurella reticulata*), although not so abundant as the former, yet is by no means a rare shell. In this species we have an opening on the apex, through which the water that has passed through the system flows. The third, the genus *Punctinella*, as exemplified by our Perforated Limpet (*Punctinella noachina*), has the opening just in front of the apex. The fourth of our series is the genus *Rimula*, of which we have no British example, this shell being confined to the Philippines, and having its opening midway between the apex and base. We possess, however, the fifth, which is the genus *Emarginula*, in the Notched Limpet (*Emarginula* parts contained within the shell, its outer edge being thickened into a glandular collar, from which the increase in the shell's size arises. When the animal desires to enlarge its dwelling, it carefully fastens this collar all round the edge of the shell. The glands in this collar, which secrete calcareous matter, then deposit it, layer upon layer, on the edges; and thus the shell is enlarged. The shape also of the shell depends on this mantle, those animals which have spinous or ridged shells having corresponding furrows and depressions in it. There are also glands in the collars of the mantle which secrete colouring matter, which affects accordingly the tint of the shell. The rest of the mantle, that is, all but the collar, is destitute of

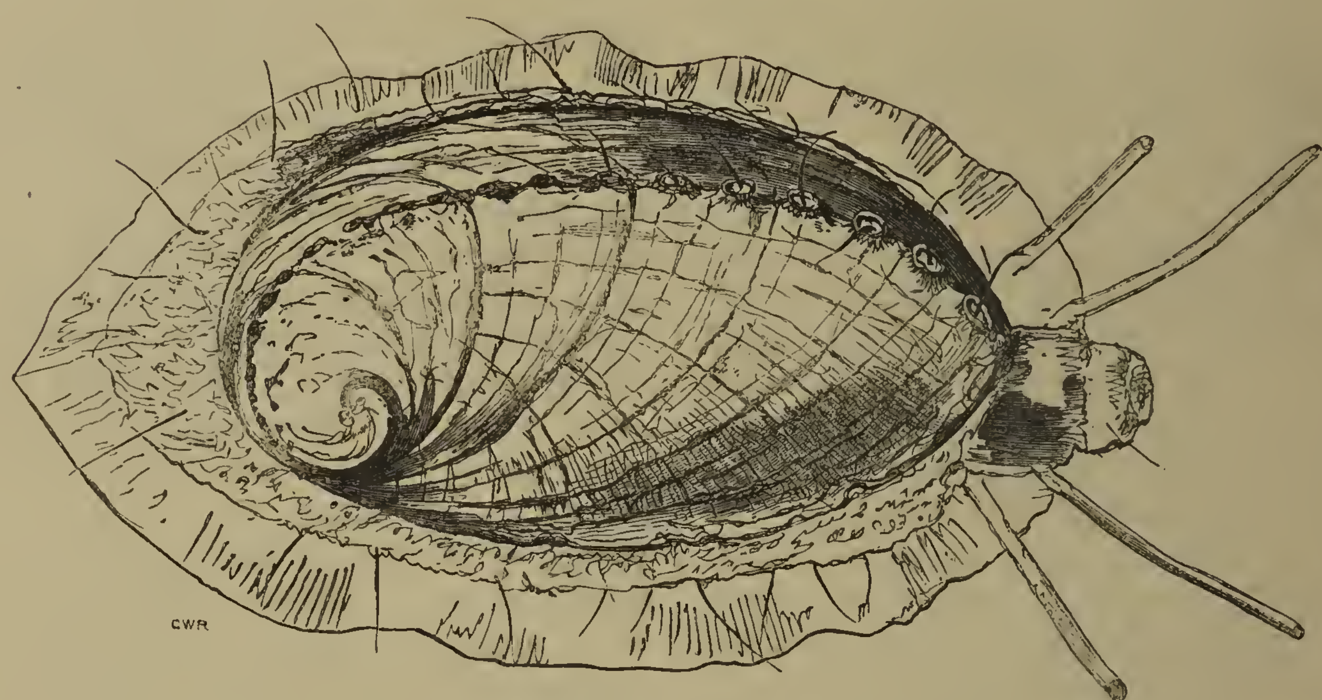

Fig. 86. Ormer Shell (*Haliotis tuberculata*).

reticulata), where the opening is at the base; and the sixth is the subject of this article, the Ormer, or, as we might more especially call it, the Ormer Limpet (*Haliotis tuberculata*), completing the series. In it we have the openings extending from the apex to the base. Guernsey is the northernmost spot in which the genus *Haliotis* is found, and it is a fact worthy of notice that specimens of the Ormer from that place are, as a rule, much larger than those from the Mediterranean Sea and other places in the Lusitanian province which it inhabits. Having now made a short survey of the shell, we will pass on to its inhabitant. Reference to the illustration, which represents the animal in the act of moving along, shows us that, like the common garden slug (*Limax agrestis*), it moves along on a broad fleshy disk situated beneath the body. This is called the ventral disk, and on it, a little elevated from it, is a smaller one, having a rough appearance, and studded here and there with some curious-looking spikes. Conchologists term this the mantle, as it in some places overlaps the shell. This mantle covers the whole of the these glands; and so the deposits from it are not coloured, but layers of a pearly substance are laid down. This forms the iridescent opaline substance so extensively used in decorations under the name of Mother-of-Pearl. What the office of the spikes may be, I am rather at a loss to determine, unless they help to prevent the approach of foes near the soft parts of the animal. I am the more inclined to take this view, as similar spines project from the apertures, where any predacious *murex* might easily insert its poison but for this provision. The head is furnished with four tentacles, the upper pair being longer and more slender. These act as feelers, a most delicate sense of touch being placed in them: they can be drawn inside the shell at leisure, folding inside out, as we pull off a stocking. When not moving, the whole animal is drawn within the shell, clinging fast to the rock.

The economical value of this species and its foreign congeners is very great. They are collected by the fishermen, who go out in boats at spring tides, and, after collecting them from the rocks, take their haul to the market. Before, however, being fit for

food, they have to be repeatedly washed in water; that which has been used for this purpose being almost as black as ink when thrown away. After this washing they are beaten with wooden mallets for some time, and are then ready for cooking. When cooked (usually fried), they are excellent food, eating somewhat like veal cutlets; they are also like veal in another respect, namely, their solidity. I can attest to their excellence from personal experience: three of them would form a very good meal. The shells of those which have been sold in the market are collected and used for a variety of purposes. The mother-of-pearl which is so extensively used in ornamenting *papier mâché* works is obtained from this, as also the substance out of which our common pearl buttons are made. In conclusion, let me say a few words on the general aspects of the islands which these, the most beautiful of our English shells, inhabit. Such an interesting field for the naturalist, in my opinion, nowhere exists so near home as Guernsey. Small as this island is, containing a circuit of only thirty miles, including all the sinuosities and windings of the coast, which are very numerous, I verily believe that in no spot within reasonable distance is such a perfect elysium for the naturalist to be found. Algologist, botanist, conchologist, entomologist, and ichthyologist will find plenty of work to put their hands and heads to in this favoured spot. Jersey, although a larger island, is scarcely at all superior to Guernsey. Perhaps in the matter of *Lepidoptera* it is a little so, but for an enumeration of them, I would refer my reader to the March number of this periodical for 1872 (page 65).

I take this opportunity of conveying my regret to "J. R. S. C." that I am unable to give any account of the larval and pupal state of *P. daplidice* or *A. lathonia*. I have a few specimens of *H. tuberculata* on hand, which I shall be happy to send to any one sending me a suitable box for the specimen and the requisite amount of postage-stamps. My address will be found in the exchange list for April, 1873.

SALLOW-BEATING.

IN last month's SCIENCE-GOSSIP (page 134) I notice that Mr. Auld, in the course of some notes upon collecting moths at sallow-bloom, says, "Many of the autumnal species which have been hibernating will be among the captures, *the commonest of which is perhaps Anthocelis pistacina*, and a few other species of the Chestnuts." This sentence is rather obscure, but Mr. Auld evidently intends it to be understood that *Anthocelis pistacina* hybernates and comes to the sallows in the spring. Now this is (if true) a novel and somewhat remarkable fact, and entomologists generally will, I am sure, feel obliged if Mr. Auld will state whether he has *himself* met with the species under these circumstances, and, if not, upon what authority he makes the statement. In saying that some of the "Chestnuts" hybernate and visit the sallows in the spring, he is undoubtedly correct, but it is well known that all the species of the genus *Anthocelis* lay their eggs in the autumn and die at, or before, the commencement of winter, as also do many other of the late autumn Noctuæ, including (notwithstanding its name) *Chariptera Aprilina*.

As far as I remember, the only species of our native Noctuæ which hybernate in the perfect state are *Cerastis vaccinii* and *spadicea*, *Scopelosoma satellitia*, *Dasycampa rubiginea*, *Hoporina croceago*, *Dasypolia templi*, *Gonoptera libatrix*, and the genera *Xylina* and *Calocampa*, and of these only a portion are known to have been taken at sallows; and if Mr. Auld speaks from personal experience when he says that *Dasycampa rubiginea* may be often thus found, I can only say that he has been exceptionally fortunate.

There are many useful suggestions in his paper, but it is advisable to be gentle in *beating* the bushes, since such a plan is very apt to bring down catkins as well as moths (thus killing the goose which lays the golden eggs). Very gentle tapping or hand-shaking is sufficient on a calm night to bring down all the insects; but by far the best plan, when the bushes are small enough, is to examine them carefully with the lantern and take off the moths as they sit on the catkins; otherwise many good things fall wide and get lost. This cannot be done with high trees, but these are generally less productive than bushes, and the cumbrous and tedious plan of spreading large sheets under them is apt to entail disappointment as well as trouble. I must also suggest that those who follow the advice to disregard the *female* sallows will probably miss many of the *best* moths, although the common ones will not frequent them in such numbers as they do the male.

I can fully confirm Mr. Auld's statement of the abundance of moths that may be obtained on favourable evenings by this mode of collecting. I once saw a hundred and fifty *Tæniocampa munda* in one evening, with *T. cruda* in thousands; and it used to be a matter of course to meet with many hundreds of *T. stabilis* and *gothica* in the the same locality. These species are common everywhere, but *cruda* is scarce in the North, while in some districts *instabilis* is excessively abundant.

Norwich. CHARLES G. BARRETT.

"THE study of geology warrants us in believing that if the human species has to become extinct, as the lower inhabitants of the earth did before its introduction, a special law would have to be called into effect."—*Taylor's "Geology of Manchester."*

SKETCHES IN THE WEST OF IRELAND.

Chapter III.

Rocks of the Burren.

As mentioned in the introductory chapter, the Burren rock *par excellence* is upper limestone, with the lower coal-measure shales overlying it at the south of the barony, while an outlier of similar rocks occurs between Lisdoonvarna and Ballyraughan. These basal shales may be seen in various places along the line of boundary of this outline; but they can be best studied in the numerous ravines about Lisdoonvarna. In most of these, an observer can walk on a bed of limestone with a wall of shale on both sides; and it is at the junctions of these shales with the limestone that the spa-wells occur, for which the place has become celebrated. Some of these waters contain iron, others sulphur, and a few magnesia in solution; and it appears remarkable that in places two distinct classes of wells should occur together; the most notable case of the kind occurring at the stream south of Rooska Lodge, where there are two springs, one sulphur and the other iron, coming out of the cracks in the rock, both quite distinct, and yet close together. To receive the water of each, small basins have been cut in the limestone rocks, and over them has been erected a small rectangular shed-like cover. The Lisdoonvarna waters are very beneficial in various ailments, especially in rheumatic cases. They have been known, and resorted to for ages; but within the last few years they have come into greater repute. In the shales will be found such fossils as *Posidonomya*, *Pecten papyraceus*, *Goniatites*, &c. The coal-measure rocks form quite a different type of coast to the limestone, as the cliffs for the most part are perpendicular and high, the highest being the cliffs of Mohen that are situated to the north-west of the Spas.

The "Burren type limestone" occurs in beds from a few inches to several yards in thickness, is more or less crystalline, and traversed by numerous systems of joints, in some cases so close together as to cut the rock into slabs like coarse slates. On account of the drying to which the bare rock is exposed, it has contracted considerably, and when thin-bedded it often breaks up into loose flaggy fragments that emit a metallic sound when struck, and not unfrequently are so balanced on one another, that when quivering in a breeze they give out a peculiar tinkling fairy-like music, quite in keeping with the character of the associated wild crags, hills, and glens: this may help to foster the love of the natives for their romantic stories and legends, few spots being without one.

Fossils are not uncommon, but those most characteristic are some of the corals, such as *Lithostrotion affine*, *L. striatum*, *L. junceum*, *L. irregulare*, *L. basaltiforme*, *L. Portlocki*, and *Alveolites depressa*. The Lithostrotia often form thick beds miles in extent; they sometimes are entirely composed of silex, as also is the Alveolites; and when the latter occurs on sheets of rock it is liable to weather out, forming peculiar-shaped marks and hollows, like human foot-prints, or the marks left by the feet of quadrupeds, that also have helped to give rise to the ancient legends. In Glen Columbkille, at the north end, is a magnificent cliff, called Kinallia, rising to a perpendicular height of 500 feet. Near its base is a bare sheet of limestone covered by these peculiar marks, due to the weathering out of the *A. depressa*, which has given rise to the following story:—In a chapel at the foot of the cliff, the ruins of which still remain, dwelt Saint McDuagh with his clerk, while, five miles distant, at the castle of Dungory, near the present town of Kinrarra, lived Gooragh, the chieftain of the country, and the saint's brother. It happened one time that provision in the glen failed, till at last the servant could stand it no longer, and prayed his master to leave the place, or they must die of starvation. The saint, however, was not of this opinion, for by inspiration he knew that his brother, with his lords and retainers, had just returned from hunting, and were at that moment sitting down to a sumptuous banquet at Dungory Castle. He therefore offered up a prayer, and to the astonishment and delight of his clerk, a repast, far exceeding anything he had ever seen or imagined, was instantly spread before him. His joy, however, was short-lived, as the chieftain and his friends did not wish quietly to give up their dinner, and the moment it took flight the cry was, "To horse and follow." This they did, and presently the saint and his frightened attendant saw them rushing on at full speed. The saint, however, was equal to the occasion, and immediately offered up another prayer, when the feet of the men, horses, and dogs became embedded in the rock, where their owners had to remain, looking on during the good man's repast. How they got away is not recorded, but the tracks of their feet remain unto this day. A lover of romance may pick up many other legends of the country—about the wicked Sheoge that carried off the children; the good Phuca that saved the cattle; the Leprahaun that sits over the treasure hid in Glen Columbkille; the Banshee that visits the O'Briens and McNamaras previous to their death; or the wild horses that come out of the caves and devour up the crops; but if recorded here, this chapter would scarcely ever end.

Indications of minerals have been observed in various places, but none of the mining works have been successful. South-west of Glen Columbkille, and a mile south-west of the ruins of Castletown, a handsome variegated yellow and blue botryoidal calamine was found; while in other places are small veins of the sulphides of iron, lead, and copper.

The drainage of the country may also be noted, it, for the most part, being subterranean, while in winter turloughs are formed in many of the valleys. It appears remarkable that in a country where water is so valuable, these natural reservoirs should not be taken advantage of, and the surplus winter water retained in them during the summer, as this, in some at least, could be done simply and cheaply.

G. H. KINAHAN.

ON THE LEGENDS AND HISTORY OF CERTAIN PLANTS.

AT a recent meeting of the Eastbourne Natural History Society, the following interesting paper on the above subject was read by Miss Van Sommer:—In the earlier ages of our earth's recorded history, human imagination busied itself in investing with mystical associations all the orders of creation, and especially the vegetable kingdom. Human life has always been closely linked with plant life, on account of our drawing so extensively from it the great necessities of our animal existence,—food, clothing, and shelter; while the structure, beauty, and growth of plants admirably qualify them for symbolical uses; as the same terms that actually express their formation, up-springing, and fructification, are used metaphorically of mankind, as we see in the Holy Scriptures, in the legends of antiquity, and in daily use.

Some words, which we often employ, have an old association with plants of which we seldom think: book comes from "beech," as this tree furnished writing-boards; paper comes from the reed papyrus, as the Egyptians employed its soft cellular pith to make paper; the Greek name of this plant is *biblos*, hence Bible; and the word *liber*, a book, from whence we get library, &c., was called after the white inner bark of a tree used for writing upon; *calamus*, the Latin for pen, is derived from the word for reed, once serving as a pen; and it is worthy of note that the names of the letters of the Irish alphabet are all names of trees, each beginning with the letter for which it stands; as A, *ailum*, the palm; B, *beit*, the beech, &c. Our word "Lent" is supposed to be derived from the lentil (*Ervum lens*), a small kind of pulse, sometimes eaten in Roman Catholic countries during the season; and the word *lens* itself is from this source, as the shape of the pea is that of a double convex lens.

Many trees and flowers themselves are made types of things they in some way represent. An almond-tree covered with blossoms signifies hoary old age; an oak, strength; the reed, weakness; the palm, stateliness and victory, because the tree is so elastic that, when pressed down, it will rise and recover its former position; the amaranth, which does not fade, signifies immortality; the ivy, clinging affection; the poppy, sleep, because of its narcotic powers. The holly and other evergreens were long ago adopted by the races of the North, as signs of the life by which nature was preserved all the winter, and they put pieces in their temples to comfort the sylvan spirits during the general death. The concentric layers of the onion made it a sign of the universe among the Egyptians.

Some plants are emblematical on account of certain events or customs: of these are the national emblems. The rose of England became especially famous during the wars of the Roses, after which the red and white were united; and the rose of both colours is called the York and Lancaster; but when these flowers first became badges of the two houses we cannot discover. The thistle is honoured as the emblem of Scotland, from the circumstance that once upon a time a party of Danes having approached the Scottish camp unperceived, by night, were on the point of attacking it, when one of the soldiers trod on a thistle, which caused him to cry out, and so aroused the enemy. The shamrock of Ireland was held by St. Patrick to teach the doctrine of the Trinity, and chosen in remembrance of him: it is always worn by the Irish on St. Patrick's Day. The leek, in Wales, as a national device, has not been satisfactorily explained, otherwise than as the result of its having the old Cymric colours, green and white. In France, the fleur-de-lis is so called as a corruption of Fleur-de-Louis, (and has no connection with the lily, but was an iris, chosen as an emblem by Louis VII. when he went to the Crusades, and afterwards named after him. The olive is deemed an emblem of peace: probably because on account of its durability of growth, it was planted both in Greece and Italy to mark the limits of landed possessions.

Very many plants owe their celebrity to the healing properties with which they are probably endowed, as their common names indicate. Of these are self-heal, woundwort, liverwort, lungwort, eyebright, loose-strife, flea-bane, salvia, from *salvo*, to heal; potentilla, from potential, &c. But in many instances these properties used to be exaggerated and distorted in such a manner that the application of certain plants in wounds and illness, merely as a charm, superseded their being used in a way that might be beneficial; and the witches' caldrons (like those mentioned in Macbeth, and the old British caldron of Ceridween), which contained decoctions of all kinds of plants, mystically prepared, were looked to as all-powerful remedies when applied with strange rites and incantations.

Some plants have been famous on account of their poisonous qualities, which in various cases have made them historical. The hemlock (*Conium maculatum*) was formerly used in Greece as the state poison, for it was the custom to put prisoners to death by its means; and it is believed that Socrates, Theramenes,

and Phocion were all condemned to drink it. The darnel (*Lolium temulentum*) is a large grass, flowering in July, which grows among barley and wheat, possessed of poisonous properties: it is supposed to be the tares referred to in the parable. The monks-hood (*Aconitum napellus*) is a very poisonous plant, even the odour of its leaves and blossoms having an injurious effect on some people: its old name of wolfsbane was given to the plant, because hunters dipped their arrows in its juice to make them more deadly. The upas-tree of Java has a great notoriety for the terrible effects it is supposed to have in causing the death of any one who lies down under its shelter, and its milky gum is also used by the natives for their arrows.

We will now turn to some plants which show by their names a connection with certain mythical personages. It is probable their grace and beauty gave rise to the invention of legends to account for their existence; as the olive-tree, being so useful, was attributed to Minerva, the goddess of wisdom, having caused it to spring from the ground as her highest achievement. The narcissus was called after a Greek youth of that name, who was so delighted with his own beauty that he gave his whole attention to watching his reflection in the water, until, being wasted to a shadow, he died. When the nymphs went to bury him, they found nothing but the flower which now bears his name, and is considered an emblem of vanity and self-love, because it prefers to grow near waters, where its image is reflected, which must have given rise to the fable. Of the hyacinths, which belong to the Asphodeliaceæ, the flowers of Paradise, there is one kind, *Hyacinthus poeticus*, that has upon its leaves two marks, a little like the Greek word for *woe*, or *alas*, and the story to account for these signs and to which the flower owes its name, is, that a youth so called was accidentally killed by Apollo, whose grief at his loss was so great that, failing to restore him to life, he caused this lovely plant to spring from his blood, and marked upon it the expression of his sorrow: our own wild hyacinth, not having these marks upon it, is termed "*non-scriptus*," not written, a puzzling name without this explanation. The name Iris is given to the group of plants so called, after the nymph Iris, the impersonation of the rainbow, on account of the exquisite blending and variety of their colours. The name Adonis was given to the genus which contains the pheasant's-eye, our brightest crimson wild flower, from the youth Adonis, who was slain by a wild boar, and whose blood is said to have coloured its petals. Similar traditions make several flowers, among others the forget-me-not on Waterloo, bear red blossoms when they grow on battle-fields. The weeping willow (*Salix Babylonica*) preserves in its name the memory of the children of Israel in captivity. The deadly nightshade (*Atropa belladonna*), most fatal of poisonous plants, derives its name of Atropa from the Fate whose office it was to cut the thread of life with her shears; the second name, Belladonna, refers to an ancient belief that the nightshade is the form of a fatal enchantress, luring to destruction by her beauty. The famous apples of Sodom, lovely to look at but turning to dust on the lips, have been identified as of the same family, Solanaceæ, to which the potato also belongs. An old Teutonic tradition connected the potato with the stars, and said that it must not be planted during the ascendancy of Pisces, lest it be watery, but in that of Gemini, that it may be full. These, with a more recent belief that it must be put in the ground on Maundy-Thursday, with many other like superstitions linking plants to particular days, of course arise from the time of year when such days fall being really about the time for sowing or planting. The Daphne (laurel) was once a nymph, who was metamorphosed, they say, into this bush by the gods, to save her from Apollo, when she was fleeing from him: perhaps this myth arose in connection with the plant being evergreen, flourishing in winter, independently, as it were, of the sun. The genus Mercurialis is called almost throughout Europe by some word synonymous with Mercury, from the notion that its supposed medicinal virtues were revealed to the world by him, in his character of Hermes, the physician. The dog's mercury is a strong poison, but decoctions of it have been used against ague; the annual mercury, which is less poisonous and less common, may be safely eaten when cooked, the water in which it is boiled retaining its poisonous qualities, as is often the case. The briar, so full of thorns, is called after the many-handed giant Briareus. The genus of plants Lysimachia, to which the little yellow-flowered loosestrife belongs, is called after Lysimachus, a king of Sicily, because he first used the plant, to put upon the yokes of restive oxen, from an absurd notion that it would render them submissive. The enchanter's nightshade, growing in dark and damp places, the resort of magicians, receives the name of Circæa, from the enchantress Circe. There are two plants for whose names we might fancy a traditionary origin, that admit of a much more simple explanation,—the herb Paris, and the Jerusalem artichoke. The former of these is so called from *par*, equal, on account of its extreme regularity: its flower consists of a calyx with four green leaflets, a corolla with four green petals; and the fruit contains four cells, while the four leaves grow round the stem and form a cross: this peculiar arrangement of the leaves acquired for the herb Paris the name of lover's knot. The Jerusalem artichoke has no connection with the famous city, but its appellation is a corruption of the Italian *girar sole*, going round with the sun, as this vegetable belongs to the genus Helianthus, so called

because the flowers always turn their faces towards the sun. The great sunflower (*Helianthus annuus*) came originally from Peru, where the inhabitants worshipped the sun; and these, his faithful followers, were held in high honour, and used to adorn temples. The flower, with its golden face and brilliant rays, looks as if constant gazing has transformed it into a likeness of the sun itself, and it is still considered as an emblem of the Christian faith, ever looking towards heaven.

The name cereals, which is given to all grains, is from Ceres, the goddess of fruits, from the care she was supposed to take in producing and preserving these useful plants. The well-known fable of the detention of her daughter Proserpine, by Pluto, for six months in the year, in the infernal regions, and her liberation for a similar period, poetically describes the seed of corn lying buried all the winter, underground and out of sight, and rising in the spring into the light and sunshine, where it remains until the harvest. Those flowers which open their blossoms after sunset were sacred, as the torches with which Proserpine was sought by her mother in the lower regions.

This intensely poetic appreciation of nature appears everywhere in the annals of the ancients, and must have given to their lives an interest which is lacking in the present day to the many, by whom she is neither observed nor studied. In those old times they were not content with merely using and enjoying the produce of the earth, but they delighted to personify the trees and flowers which were of so much service to them, and to express their gratitude by acts of worship and sacrifice connected with them, blindly giving to things inanimate the adoration they felt was due somewhere. The superstitions in many nations, far remote from each other, have so much similarity as to indicate a common origin, which we find in the trees of life, and of the knowledge of good and evil, in the garden of Eden. For example, the Scandinavians said that the first man was formed from an ash-tree; and they worshipped the ash, which they called Yggdrasil, the tree of the universe. This tree was represented having roots spreading towards heaven and hell, and the regions of frost, at which a serpent gnawed, and on the top was perched an eagle, which had carried off the sacred mead: dew was poured over it by the fates to preserve it from decay. Here we have many elements introduced which are explained by the account of the fall in Genesis; and tradition further possessed the ash with much healing virtue. It was once a custom to pass cripples through a natural rupture in this tree as a means of cure; also the leaves of an ash in which a living shrew-mouse had been buried, were considered to heal the bite of the shrew, which was thought most poisonous. The almost certain fact of the descent of the Scandinavians from the Ashkenaz of Genesis x. may by the similarity of the word to the ash account for their derivation from the tree. The Jews still give the name of Ashkenazim to the German part of their community. The toughness of ash wood made it very suitable for the manufacture of weapons, and the Greeks therefore dedicated it to the god of war: its Latin name, *fraxinus*, means lance. In Northern Europe there are many superstitions connected with the mountain ash, or rowan: it was considered a charm against storms, and was carried in ships, as the god Thor, they said, had once been saved from drowning by catching hold of it, and they thought he would never launch his thunderbolts against a vessel which contained a piece of this tree. The traditional broomstick of witches was made of rowan, and their enchantments, called runes, were written on little pieces of its bark. The rowan was also said to spring up on the graves of innocent persons put to death. It is a curious fact that an ash is also sacred in India.

To ourselves the oak is the most interesting of all mystical trees, owing to its extreme sanctity in old times; but this sanctity, the origin of which is very difficult to discover, was not confined to Britain. In Hebrew its name "El" suggests a sacred connection; idols carved of *oak* are mentioned by the prophet Isaiah, and there are many particular oaks spoken of in the Bible. In Grecian mythology we hear of the oaks of Dodona, from whose branches oracles were delivered. There was a strict connection between Jupiter as the thunderer and the oak, which was supposed especially to attract the lightning; and this tree is more frequently struck than others, while the zig-zag character of its boughs reminds us of the course of lightning. The name of the oak in Welsh was "derw," and this compounded with "gwydd," a wise man, made up the term Druid. The Druids seem to have identified the oak itself with the object of their veneration, and performed their rites, which were accompanied with human sacrifices, among a grove of thick oaks on which the mistletoe was to be found. They considered everything growing on the oak sacred, and said that seed of the mistletoe was deposited on it by a heavenly messenger: it is in fact carried by a bird. The mistletoe was called "the tree of pure gold," and it was gathered by the arch-druid with a golden sickle; they invested it with life-giving powers, which they said it derived from the bright sphere above the sky. The name mistletoe comes from two words, *mistl*, different, and *tan*, a twig, being a twig different from the tree on which it grows: it was a celebrated plant throughout Northern mythology, and also in India. Parasitic plants were generally regarded with awe, and to this day in Wales the peasants are afraid to gather the dodder on a journey, lest, if they do so, they should be killed by the fairies before they reach their destination. There is a fungus which pro-

duces what is called smut in corn, by consuming the farina, and this the Romans thought was the work of an angry god whom they called Rubigo, and to whom they offered sacrifices in the month of May, praying him not to hurt the corn.

Of all fruits the apple has the widest and most mystical history. The golden apples of the Hesperides afford only one instance of the extreme care with which it was everywhere guarded and sought after. In Arabian tales it is the fruit endowed with all healing virtues, and in the North it is represented as the food eaten by the gods to make them young again, if they felt any signs of old age: the forbidden fruit is extensively thought to have been an apple, which idea is found in some mythologies, where the apple is often itself the tempter.

The lotus is one of the most interesting of legendary plants, but there is a great deal of perplexity connected with its history, as there are many plants to which the name of lotus has been given, and it is very difficult to identify the sacred lotus, which, if not actually worshipped by the Egyptians, received divine honours, as an emblem of life and growth, and of the sun springing from the ocean, also, on account of its luxuriance, of the earth's fecundity. This plant, which is reported to have been most beautiful, is said to have sprung spontaneously from the watery expanse of the Nile, unfolding its leaves and gorgeous blossoms above the surface of the water. This is symbolized by the poets to mean "the soul drawn out of an evil nature, and surmounting the bounds of sense." The leaves of this plant resist water, which "trickles from them as from a lion's mane;" so an Eastern proverb compares a man who resists temptation to a lotus-leaf.

The lotus was sacred to Isis, the chief Egyptian goddess, and was represented as forming the throne of Osiris; it was also sacred in India, where images of Buddha always show him holding the lotus in both hands.

Another famous lotus was the food of the Lotophagi, or Lotus-eaters. The followers of Ulysses arrived in their wanderings in the land where these people lived, and being presented with its fruit, they succumbed to the intoxication it produced, which brought oblivion of all their former sorrows; and giving themselves up to the pleasure of eating it, they lost all care, and consciousness of everything, except the present lassitude and enjoyment in the land of the lotus, as we may read in Tennyson's beautiful poem. The list of plants bearing the name of lotus is too long to give here, and there exists much controversy respecting which *were* those two most famous. The result of a discussion on the subject in SCIENCE-GOSSIP, 1870, seems to be that the *Nymphæa Lotus*, the great water-lily of the Nile, was the most sacred plant; and the *Nelumbium speciosum*, of the Bean tribe, also a most beautiful plant, the food of the Lotus-eaters; but different authorities hold different opinions on the subject.

Another celebrated lily is the Amancaes, or golden lily of St. John, which grows in Peru, and is regarded as a sacred flower. There is still a festival held every midsummer day, in a village near the city of Lima, in connection with it. The inhabitants all leave the town to gather the lily, which they find blooming in abundance on the surrounding hills. They afterwards offer the blossoms at shrines in two little temporary chapels erected in the valley for the occasion. In Europe there is a whole family of plants known as St. John's worts, and formerly in London one of them, the *Hypericum perforatum*, was gathered and thrown into the bonfires which were lighted on St. John's Eve. In France and Germany some of the peasantry still gather its yellow blossoms with much ceremony on the same day, and hang them up in their houses to avert evil; in Scotland it was also once worn to preserve from witches and enchantments: there is scarcely another small plant which has so wide a sanctity as this. Owing to the time of year when St. John's Day falls, when the summer flowers are in all their beauty, very many are connected with his name, and used as charms in Germany against all the spirits of the Walpurgis night which was that of St. John's Eve, when the midsummer fairies also held their revels.

Another humble plant of great repute is the vervain, which has nothing in its appearance to warrant its being so holy a herb. Pliny mentions it as being used in casting lots and telling fortunes; and as being carried by the Roman ambassadors when they went to declare war, to give defiance to their enemies; but another writer states that it was carried in treaties of peace, representing the god of war in his more merciful moods. The Druids gathered the vervain with the left hand, at the rising of the dog star, from spots upon which the sun and moon had never shone; they waved it in the air, and then anointed the earth with honey, to compensate it for the deprivation of the precious plant. The Romans said it would make all cheerful at the feast to have the room sprinkled with water in which vervain had been steeped: they said also that it would cure thirty complaints. It was associated among the Druids with another little plant, the rue, which they called "Gras Dun," the herb of grace; they thought it too holy to touch with the bare hand: it was supposed to cure dim sight. In the Tyrol it was associated with agrimony and other plants, which, being carried about, were said to endow the bearer with supernatural vision. It is curious that agrimony should be so associated, as the name of that plant is derived from Argos, the hundred-eyed giant, who is said to have kept his eyes in good condition by its use. Rue and rose-

mary are often joined together: the name of the latter means "dew of the sea," and it was supposed to be useful for strengthening the memory: its name in all languages has reference to some special use or property.

Those plants to which we have directed our attention, and with most of which we are well acquainted by sight, are only a few of the great number having superstitions associated with them: the connection is sometimes to be traced to its source, but, very frequently, there is no ostensible reason for it. All the heathen divinities had their particular plants; and, with equal superstition, in the Christian era, the Roman Catholic saints have flowers dedicated to them. Very many belong to the Virgin, as is seen in their names,--Lady's tresses, Lady's slippers, Marigolds, &c. &c. All star-shaped flowers have been revered, and dark and poisonous plants held in awe. In the study of these things, there is no botanical, nor particularly useful result; but as plants have been given to us in such abundance for our enjoyment, we think it cannot be uninteresting at least to trace the connection between many of them with legends and history.

THE DIATOMACEÆ AND HETEROGENESIS.

IN the January part of the *Lens*, Professor H. L. Smith publishes some severe remarks on Dr. Bastian's assertion that Diatoms and Desmids are developed from Confervæ, &c. "Dr. Bastian at p. 455 says: 'It seems, however, to be quite certain that a community of nature exists between Algæ, Pediastreæ, Desmids, and Diatoms, since similar vegetable cells may, on the same or on different occasions, grow into forms belonging to either one of these groups; and, moreover, the forms *are strictly convertible with one another* until *they chance to assume the form of Diatoms*. . . . Diatoms constitute the terminal forms of a divergent series, the middle term of the series, however, viz. Pediastreæ and Desmids, are convertible in both directions, either back into Confervæ or onwards into *less-vitalized Diatoms*.' The italics are our own. Now here we have a distinct assertion, but, as we shall see, it is simply an assertion supported by no real proof. Dr. Bastian knows very little about Diatoms or Desmids, and deals with them altogether at second-hand, and from very doubtful authorities. As to the less-vitalized character of Diatoms and their *chancing* from Pediastreæ and Desmids, no one at all familiar with them in the living condition can for a moment believe it. They have a far more complicated internal structure than the more highly vitalized (!) Pediastreæ and Desmids, from which, according to Dr. Bastian, they may chance to assume their forms. We have observed the growth and reproduction of Diatomaceæ to little purpose, according to Dr. Gros and Dr. Bastian. We have witnessed more of conjugation and growth probably than any other person, and can affirm, without fear of its being disproved, that such chance, or, indeed, any kind of transformation of Pediastreæ or Desmids into Diatoms, never has happened, nay, more, never will happen. Dr. Bastian has never seen it; and as for Dr. Gros,—well, twenty years ago men might be pardoned for believing many things which we smile at now. When Dr. Bastian or any competent observer watches the transformation *through* every stage, and no link of the chain is missing or defective, then, and not till then, will we believe it. . . . What we insist upon is positive proof; and that Dr. Bastian has been misled by appearances (and by Dr. Gros), or, to use his own words nearly, that his 'presumptions have stolen a march upon established facts,' will, we think, be tolerably evident as we explain some of the appearances actually observed by Drs. Bastian and Gros. We pass by Dr. Gros's own words quoted by Dr. Bastian, and come to the actual observations of the latter. We will not question now that part that relates to the production of 'unmistakable filamentous Desmids.' . . . We look more particularly to the account of evolution of Diatoms, fully convinced, however, that the errors of misinterpreting what he saw, are quite as great with the Desmids as with the Diatoms. The woodcut entitled 'Modes of Origin of Desmids and Diatoms,' has, by way of explanation, é é * * * * [see fig. in 'Beginnings of Life']; Pediculated Diatoms were also seen budding from the same cladophora filament.' Poor as the cut is, we easily recognize these 'pediculated diatoms' as *Achnanthes exilis in its normal condition;* and if Dr. Bastian wishes it, we can show him thousands of this well-known form pretty much as he figures it, growing on a pedicel, the result of its own secretions, not only on *cladophora*, but quite as frequently on Mongeolia, Vaucheria, or some freshwater alga.

"The marine forms *A. longipes*, *A. brevipes*, *A. subsessilis*, &c., all attach themselves by a similar stipes to marine conferva.

[I have *A. longipes* and *A. brevipes* attached to a fragment of decayed wood, and *Synedra investiens* and *Rhipidophora abbreviata*, originally growing luxuriantly on a buoy at Scratby, Norfolk. On scraping them off, I found the stipes attached to the fragments of wood, pretty conclusive evidence that they were not buddings from any other form of alga.—F. K.]

"What is represented by Dr. Bastian then is no process of *budding* at all.

"Any one who will observe the large and living Diatoms with care will notice the nucleus and ramifying nerve-like threads, and the beautiful distribution of endochrome with reference to these.

"In addition to the nucleus and ramifying threads, many Diatoms exhibit a germinal dot, with reference to which the endochrome is arranged rather than to the nucleus; particularly this is the case with Surirella. We may add that the coloured figures in Smith's British Diatomaceæ are caricatures; indeed, the late Tuffen West * admitted to us that some of those representing conjugations were manufactured to order.

"With regard to marine forms, which are far more numerous than those in fresh water, we might ask where did *they* originate, or, rather, how became terminals of a series, with Pediastreæ and Desmids for middle terms? since, if we mistake not, these middle terms are seldom if ever found, except in fresh water! Perhaps this might not appear much of an objection, inasmuch as some species affect equally well fresh and salt water. But if we get the gist of Dr. Bastian's argument, he would not only have us believe that Bacteria, &c., originate *de novo*—which at present we grant—but that somehow (the way not yet proved) say fungus-spores, Euglenæ, Astasiæ, Actinophrys, or something else, came from these 'first beginnings,' and next, that somehow, not yet shown how, Pediastreæ and Desmids, and finally Diatoms, came from the previous existing organisms, all a series of transformations not affected once for all, but continually going on, so that all these things are being manufactured, as it were, every day.

"Doubtless bacteria were developed at a very early period of the earth's history (Dr. Bastian informs us that they soon make their appearance after a prolonged boiling of the infusion); but somehow these primæval 'beginnings' appear to have been very chary of evolution, as neither Diatoms nor Desmids appear earlier than the Cretaceous, or what is far more probable, 'the Tertiary.'"

[Dr. Bastian seems to have fallen into the error that many other superficial observers have done; viz., in supposing that there is a similarity of structure between Desmids and Diatoms. They resemble each other in propagation by self-division, but the Diatom frustule divides longitudinally, the Desmid divides transversely. The new half of the Desmid is usually quite rudimentary, even after division has taken place; in the Diatom the new valve is perfect. —*F. K.*]

Norwich. F. Kitton.

"The hypothesis of evolution is not simply legitimate instead of illegitimate, because representable in thought instead of unrepresentable; but it has the support of some evidence, instead of being absolutely unsupported by evidence."—*Spencer's "Principles of Biology."*

* Professor Smith has been misinformed: Tuffen West is still living.—F. K.

A PROBABLY NEW SPECIES OF ORTHOCERAS.

(*Orthoceras pennatum.*)

The accompanying drawings are of specimens of an Orthoceras which occurs in a bed of shale in the Millstone Grit, about seven miles S. W. of Ripon, and which seems to possess many interesting peculiarities. I have never found a perfect specimen; but from the parts preserved, it seems possible to restore the form of the whole shell. The lower portion consists of a considerable number of concave casts of the air-chambers, separated by very delicate partitions (figs. 87, 91, 94), which are connected by a central siphuncle (though the presence of this is with difficulty discerned). The partitions (*septa*) of the air-chambers

Fig. 88.

Fig. 89.

Fig. 87. Fig. 90. Fig. 91.

Fig. 87. Lower part of Orthoceras, bent to one side.
Fig. 88. Outside of lower part.
Fig. 89. Extreme end of Orthoceras.
Fig. 90. Section of end, showing partitions and air-chamber.
Fig. 91. Upper expanded and lower portion of *Orthoceras pennatum.*

are joined to a thin wall of shell, which is smooth, or nearly so, externally (figs. 91, 92), showing very slightly the places of the septa, and expanding in the upper portion of the shell into a very large open chamber (fig. 91), which is strongly marked with a number of parallel rings (fig. 93), approximating closer to one another as they approach the upper portion of the shell. This seems to me to

be the interpretation of the form 95. The lower part of the shell terminates in a blunt point, and is bent to one side (figs. 87, 89, 91), in this resembling the *pen* of the uncinated calamary.* One specimen shows the former presence of *fins* (fig. 94, *b*). The upper part of the shell seems to have been rounded off, and slightly depressed on one side; in this reminding one of the pen of *Sepia Orbigniana*.†

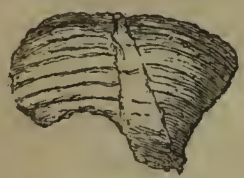

Fig. 92.

Fig. 93.

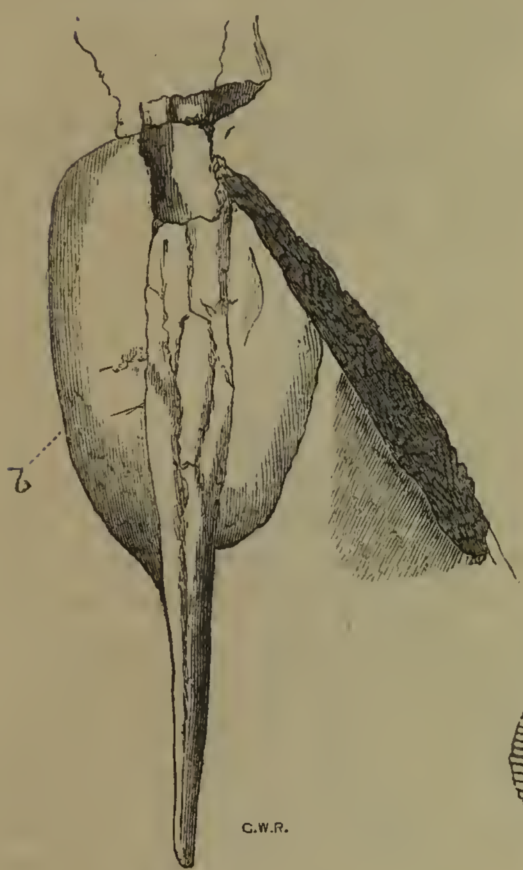

Fig. 94.

Fig. 95.

Fig. 92. Portion of external wall of shell.
Fig. 93. Exterior, showing parallel rings.
Fig. 94. Lower portion of shell *in situ*, showing supposed fins.
Fig. 95. Portion of upper part of shell, showing approximation of rings.

Dr. Woodward considers ‡ that the shells of the Orthoceratidæ were external. In many species this was most probably the case. But, in the present species, all the remains seem to indicate that it was an internal shell, having the same kind of functions to perform as the Belemnite, which is an acknowledged internal shell. The presence of fins, and the large upper chamber, rounded at the top, as well as the delicateness of the shell, seem to indicate this.

I have attempted in figs. 96, 97 to restore the former appearance of this shell, fig. 96 being its supposed external form, and fig. 97 a section. As this seems to be an entirely new species, I would propose to name it *Orthoceras pennatum*, or finned Orthoceras.

J. S. Tute.

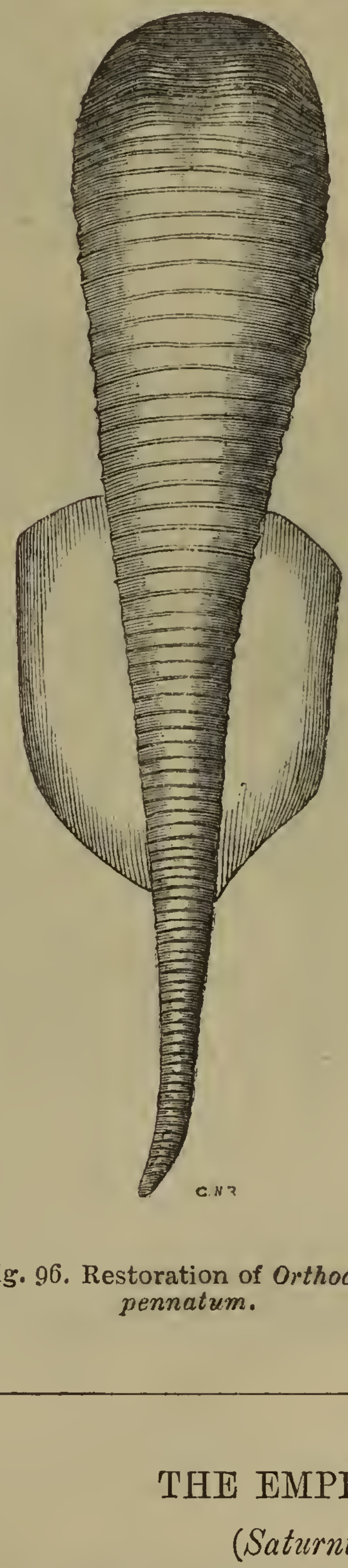

Fig. 96. Restoration of *Orthoceras pennatum*.

Fig. 97. Restored section of ditto.

THE EMPEROR MOTH.

(*Saturnia carpini.*)

A FEW interesting notes on this handsome, but happily not uncommon, moth appeared in Science-Gossip last year, at page 230. The caterpillar, however, was dismissed with the short statement that it "is a delicate pea-green, each segment having a broad band of black, adorned with pink tubercles, each of which emits a few hairs." This description applies *only* to the larva in its last stage, and perhaps a few notes on the earlier stages may not be unwelcome to some entomological readers. The changes which it undergoes are certainly very remarkable; being a very prominent object in its adult stages, it is then found with little difficulty; but probably many a young collector on the search for "pretty" caterpillars passes it by in its juvenile form. I have not reared it from the egg, so that I am unable to describe its first appearance. The

* See Woodward's "Mollusca," Plate I. fig. 8.
† Ibid., Plate II. fig. 2.
‡ Ibid., p. 87.

following notes, however, I extract from my diary of a few years back.

On the 9th of June, while resting on a bank in the vicinity of several bramble-bushes, I caught sight of a number of small *black* larvæ feeding. They were not then half an inch long, but were wrinkled and hairy; of course I cannot tell how many times they had then moulted. They shed their coats, however, once or twice more, still appearing black, and then appeared in a black suit,

Fig. 98. Emperor Moth (*Saturnia carpini*).

with dull orange rings, each ring with black, hairy tubercles. All along each side just above the feet was an orange line.

At the next moult there was the same general arrangement, but the rings were bright sulphur-yellow, and the lower line had a greenish tinge; tubercles black.

Fig. 99. Caterpillar of Emperor Moth.

Next change: The yellow much brighter, with a greenish streak behind each ring; both the yellow and green markings interrupted in the dorsal line.

Fig. 100. Cocoon of ditto.

Next: All ground colour *green*, with no connected rings; but the rows of tubercles still existing, black in colour, and a thin black line between the segments.

Next: Ground colour lighter green; tubercles orange, with the black line behind each row.

Next: Ground colour darker green; rings black and broader than before; tubercles light orange.

Just before spinning, some individuals had the black rings strongly marked, others were without them. The changes are exceedingly interesting to watch; I wish I had examined and noted them with greater care. We find them in this neighbourhood every year by careful searching in the beginning of June, so perhaps I may have another opportunity this season. I find them on bramble, which they eat very readily. Let me recommend my young entomological friends to hunt for them, and never pass over anything because of its homely appearance. I was amply rewarded by finding my black captures gradually assuming the garb of the handsome larva of *S. carpini*.

HENRY ULLYETT, *Folkestone*.

P. S.—There is a great mortality among them at moulting times, the cause of which I cannot tell; but I never succeed in rearing more than half of them.

THE SEA-URCHIN.

(*Echinus sphæra.*)

THERE are few commoner sea-side objects than the common Sea-Urchin (*Echinus sphæra*), whose external resemblance to the hedgehog, which, in many districts, goes by the name of "urchin," has earned for it both its popular and scientific name. The rough, unkempt, and bristly hair of the young of the highest of all known animals has not unfrequently caused the word "urchin" to be applied for a similar cause. Some of our readers may be acquainted with the comical heading to the chapter on Sea-Urchins, sketched by the jubilant professor in Forbes's "History of British Star-fishes," in which two urchins (human) are represented setting a hedgehog at a living Echinus. The surprise of the hedgehog at the spiny-skinned inhabitant of the deep is capitally represented in the vigorous style of fun for which poor Forbes was celebrated. When the Sea-Urchins are dead, and the epidermis has peeled off, carrying with it its thick coat of spines, the test is naked, or roughened only by the tubercles to which the spines were attached in the living state. These tests, or shells, are then popularly called "sea-eggs." At very low water, hiding underneath stones, or in the fissures of rock, you may often gather Sea-Urchins of all sizes and ages. We know of few animals which can be turned to better use by the young zoological student. The mode of attachment of the numerous spines to the test—the "universal joint" now so much used by mechanics, but which has an antiquity far transcending the human period—may here be seen to advantage. Those curious and, until recently, un-

known objects, attached to the spines, called *pedicellaria,* are also both elegant and instructive microscopical objects. The construction of the test or shell of the Sea-Urchin, with its hundreds of plates that grow along their margin from the young to the adult condition, five rows of which are perforated by thousands of minute holes (the ambulacral plates), the separate plates at the summit surrounding the anal orifice, through which the sea-water is filtered and allowed to pass into the internal water-vascular system—all these are features whose careful study will train the young student to habits of accurate observation. Nothing can exceed the marvellous economy which provides for the locomotion of the Sea-Urchins. The "water-vascular" system, as it is called, gives out pipes that run in front of each row of ambulacral plates, and these, in their turn, branch off into thousands more. Each of the latter penetrates the minute perforations to be seen in the empty shell when it is held up to the light, and extends even beyond the spines. Each has a sucker at the end; so that by means of these pipes, which are lengthened at will by water being forced into them, the Sea-Urchin can warp itself along the sea-bottom. The fossil forms found even in the primary rocks tell us how long both the mechanism of the test and that of the water-vascular system has been in existence.

A transverse section of one of these common spines, if properly and thinly cut, forms a most beautiful microscopic object, as fig. 101 shows. The sketch here given as an illustration has been copied by Dallastype (the process to which we referred in the last number of Gossip), and printed from a drawing from the microscope by R. Connor, Esq. Thus seen, the transverse section resembles knitted anti-macassars, only that the latter rarely equal it in beauty. Perhaps some of our fair readers may take a hint from the "pattern" here given.

J. E. Taylor.

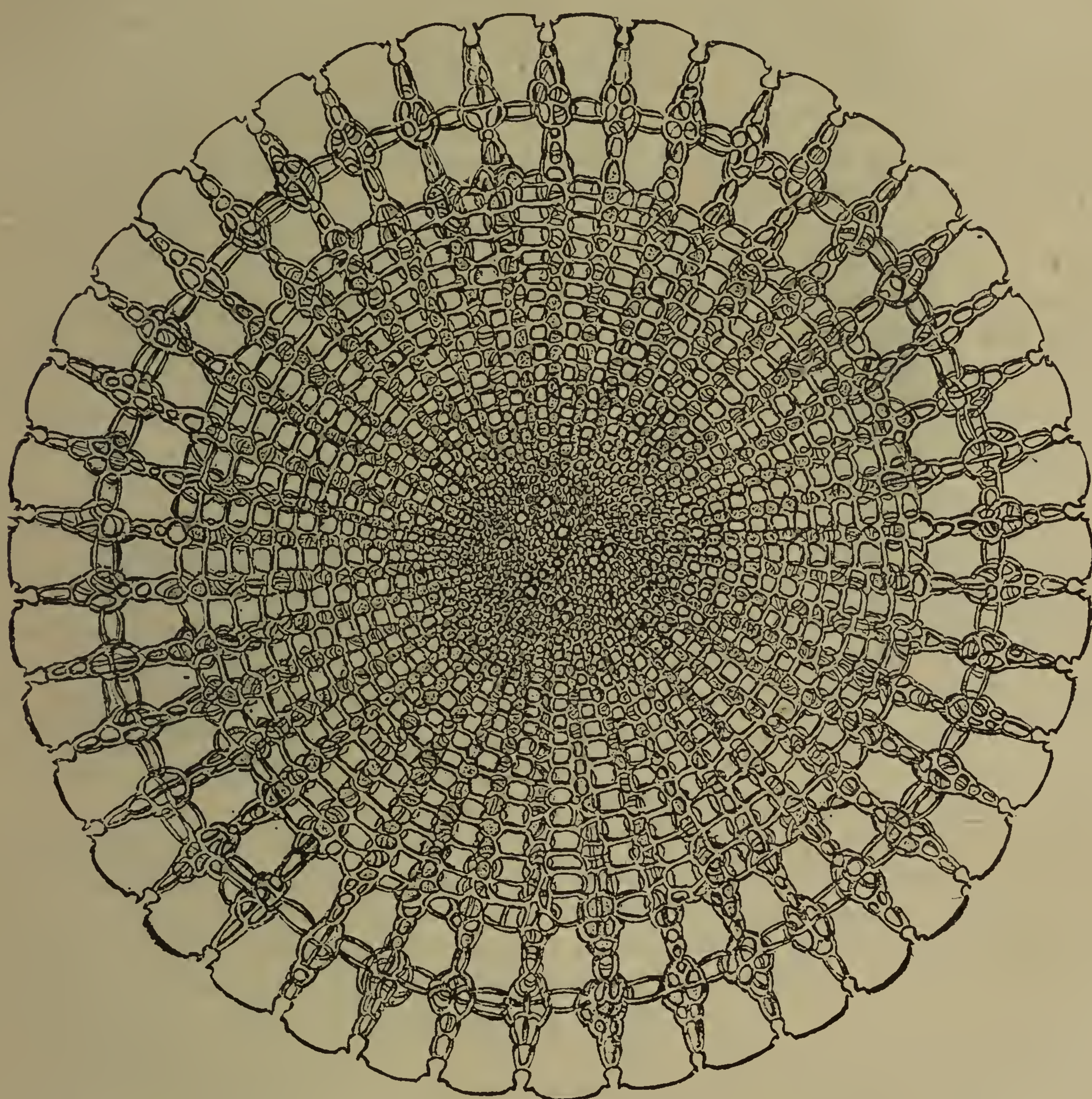

Fig. 101. Magnified section of spine of *Echinus*, from a pen-and-ink sketch by G. R. Connor, Esq.

Blue Titmouse.—A friend of mine saw (last spring) a little blue tit with a caterpillar in its mouth, endeavouring to feed one of its young ones, which had fallen from the nest, and was quite dead. —*W. H. Warner, Kingston.*

ON PREPARING LEPIDOPTERA FOR THE CABINET.

By Claude Ryan.

Larvæ.—The caterpillar to be preserved should be killed by immersion in spirits of wine, and the intestines should be extracted through the anal orifice by means of a crochet-needle. The skin should then be inflated by a fine glass blowpipe to its natural form, and dried as quickly as possible before a fire, or, what would be better, in a small metal chamber, heated by gas or a spirit-lamp. The object should then be mounted on a twig or leaf, and the inside well washed with a solution of corrosive sublimate. The parts which may have faded should be re-tinted with a camel-hair brush and colour.

Pupæ.—The preservation of pupæ is very easily managed. The live chrysalis may be killed by being plunged into boiling water, or the empty shell may be filled with wool, coloured to give it the natural tint, and the parts which have been split asunder by the emerged insect may be gummed into their proper form. The pupæ of the butterflies should be allowed to remain on the twigs, &c., on which they are found, in order to show the manner in which they are fastened; whether hanging downwards by the tail, as the *Vanessidæ*, or fastened in an upright position by means of a silken girdle, as *P. Machaon* (Swallow-tail), or *P. brassicæ* and *P. rapæ* (Large and Small Garden Whites), and many others.

The cocoons should also be kept, and where they exhibit any peculiarity of construction (as those of *S. Pavonia* minor), should be cut in half.

Imago.—The modes of killing the perfect insect are various, and each plan has its supporters. Among the best of them I may mention the following:—

The cyanide-bottle, which is made by strewing the bottom of a wide-mouthed-bottle with cyanide of potassium (which is a deadly poison), and over this a layer of plaster of Paris sufficient to cover it. The ammonia-bottle has a thick pad of blotting-paper at the bottom, on which a few drops of strong liquid ammonia may be dropped before using. The aurel-jar is composed of alternate layers of pounded laurel-leaves and blotting-paper.

Insects may also be killed by being stabbed in the thorax with a penknife dipped in strong oxalic or prussic acid.

Of the above, the first is the one which I recommend. The ammonia vapour of the second is apt to destroy the more delicate colours of insects left long under its influence, and the laurel-jar is too large, and not speedy enough in its action for field-work.

Specimens may be set on either rounded or flat setting-boards. Rounded setting-boards are preferred by many entomologists, on account of the specimens set on them being readily distinguished from Continental lepidoptera, which are set on flat boards, the wings being kept in position by the weight of little flat pieces of glass instead of braces.

Another way applicable to either round or flat setting-boards is to keep the extended wings in position by winding thread round them. For my own part, I use flat corked boards, cardboard braces being used to keep the wings in their places; for, besides imparting a much more natural appearance to the specimen, it is in my opinion considerably easier to manage. Insects should be set so far on the pin, that when stuck into the corked drawers of the cabinet, the body and wings should not reach the surface. By this means they are in a great measure kept out of the way of mites and other pests.

Specimens which have been badly set should be relaxed and reset. To accomplish this, place them on pieces of cork on the surface of a bed of damp sand until the wings are sufficiently limp, and then reset them, taking the precaution of leaving them longer on the boards than fresh specimens.

Large-bodied moths should have the contents of the abdomen extracted, and then refilled with cotton wool dipped in corrosive sublimate. Unless these steps are taken, the bodies and wings of the specimens, and the paper underneath them, will become covered with patches of grease, which it is impossible to obliterate. The corrosive sublimate I have mentioned is used as a preventive against mites.

To make it of the proper strength, put six grains of the sublimate to an ounce of rectified spirits. A feather or piece of black paper will, when dipped in this, have the appearance of being mildewed if the solution is too strong, and more spirits should be added until it is of the proper strength.

MICROSCOPY.

On the Characters of the Epidermis of the Tway-blade (*Listera ovata*).—At a late meeting of the East Kent Natural History Society, Mr. Gulliver, F.R.S., exhibited specimens of the cells of the epidermis of some orchids, and crystals in the Elm. They are interesting contributions to phytotomy, and likely to prove acquisitions to amateur microscopists. The subjoined notices are from the abstracts of the proceedings of the society in the *Kentish Gazette*, a newspaper so distinguished for its intelligent appreciation and excellent reports of provincial natural science, as to take a lead therein, and set an example in the diffusion thereof, which we hope to see more extensively followed, as will surely be the case with the advance of education in rural dis-

tricts. Mr. Gulliver stated that though the epidermal cells of plants often afford good diagnostic characters, it is remarkable that they have been little used. The object of the present communication was to show that these cells of *Listera ovata* differ from those of other orchids. In this species, the epidermal cells on the under surface of the leaf have remarkably sinuous boundaries, so as to form a good example of that common kind of epidermis which botanists have named Colpenchyma, while on the upper surface of the leaf of that same plant the cells have smooth margins, more or less polygonal from mutual pressure of roundish or oblong cells. Thus, besides the stomata on the under side of the leaf, the epidermis of the two sides differs so plainly and curiously as to present very pretty microscopic objects. At the same time, for comparison, examinations were made of the corresponding tissue of *Orchis mascula*, *Orchis fusca*, *Ophrys muscifera*, and *Ophrys aranifera*, in every one of which the epidermal cells, on both the upper and under sides of the leaf, were much alike and—save the stomata on the under surface—resembling the same cells on the upper side of the leaf of the Tway-blade. To define the exact value of this character would require an examination of the wilderness of exotic orchids as well as all our native species. But the remarkable character now described suggests a wide and probably fertile field for future cultivation. At present we know that, among the Duckweeds, *Lemna minor* is easily distinguishable, by its sinuous epidermal cells, from *Wolffia arrhiza*, though these two plants were formerly considered as identical.

On the Crystals in the Seed-coat of the Elm-tree (*Ulmus campestris*).—At this season, or a little earlier, the fruit of the Elm is shed and scattered in profusion on the ground, often so as to make patches in our paths. Each fruit is a capsule, somewhat oval, very flat, and about as big as the thumb-nail. The seed is contained near the centre of this compressed and winged capsule or samara, and the outer coat of the seed is the seat of the crystals. Every cell of this part contains a short and brilliant crystal, in form cubical, lozenge-shaped, or prismatic, and presenting a long diameter of about 1-2666th, and a short diameter of 1-3555th of an inch. They are beautiful microscopic objects, and perhaps may be found well adapted for experiments with polarized light. The crystals are composed chiefly of oxalate of lime.

Saccharo Polariscope.—"W. L.'s" assertion that the round bottom of the tube forming a plano-convex lens would prevent any light reaching the eye is simply absurd. How is it that an ordinary "Bull's-Eye" allows the light to pass through it, and illuminate an object far beyond the focus of the lens? In fact, if "W. L.'s" assertion were true, convex lenses would be useless, and refracting microscopes and telescopes could never have been made. If, instead of assuming a tone of superiority, "W. L." had stated why a ray of light would not pass through a plano-convex lens, he would have conferred a benefit on "young people ignorant of optics," and also upon myself. My experience has been to the contrary. The following diagram will

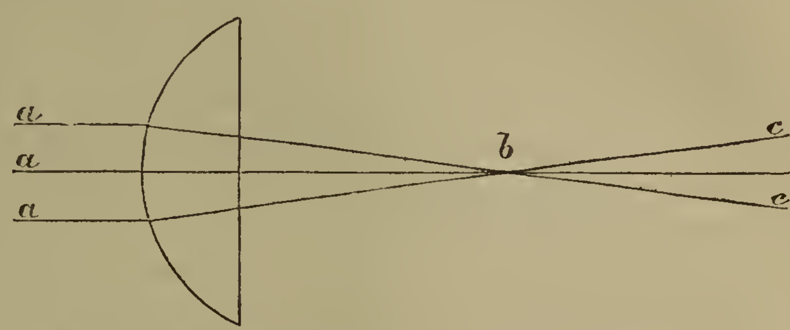

Fig. 102. Diagram showing passage of light through plano-convex lens.

perhaps enable "W. L." to understand how a ray of light does pass through a plano-convex lens:—*a*, *a*, *a*, parallel rays of light converging to a focus at *b*, afterwards forming the divergent rays *c*, *c*. Every one with the least knowledge of optics is aware that the rays of light are less refracted as they approach the centre of the lens, and of course are less divergent. There can be no reason why they should not enter the eye at a considerable distance from the focal point. The tube I use is about fourteen inches in length and three-quarters of an inch in diameter, and when filled with a solution of sugar allows a brilliant beam of polarized light to reach the eye, as "W. L." would have found if he had tried the experiment, instead of assuming that I had not done so. I am quite aware that a far superior arrangement for the purpose required by "F. M. S." could have been supplied by a first-class optician, but the inquiry was for a cheap and simple form of instrument. The tube of glass might also be replaced by one of vulcanite, with diaphragms fitted in the interior, and the wooden stand replaced by a metal one;—but simplicity and cheapness would have to be sacrificed.—*F. Kitton.*

ZOOLOGY.

"The Saturday Half-Holiday Guide."—It is with pleasure that we notice the cheap little *brochure* bearing the above title, as we feel confident it is just the sort of thing often much wanted by young naturalists. It gives a capital description of the parks, environs, sports, historical sites, antiquities, &c., of the neighbourhood of London; but what is more to our point, it directs the naturalist to the metropolitan natural history resorts, and records the habitats of rare plants, the birds, the best entomological resorts, the microscopical collecting-grounds, the places where certain mosses,

lichens, &c., are to be met with, and the localities for fossil-collecting. The work is accompanied by a capital map, which will help the stranger in no small degree. The book has been well got up, and capitally edited by Mr. Henry Walker, F.G.S.; and the only thing that has astonished us in it is its price—threepence!

THE DISTINCTION BETWEEN ARGYNNIS AGLAIA AND ADIPPE.—This is often a source of perplexity to young entomologists. Stainton's "Manual" is slightly misleading, because it states that there are no silvery spots on the undersides of the fore-wings of Adippe, whereas there are generally two rounded spots noticeable, as also in Aglaia; but the latter has, besides, other smaller spots near the tips. The size also is not distinctive; for though the "Manual" gives measurements to show that Aglaia is the larger of the two, it does not hold good as a rule. The best point of distinction is the irregular row of reddish-brown spots with silver centres just above the marginal row of silver spots on the underside of the hind-wings, which only occur in Adippe. Another difference, scarcely to be deemed scientific, is, as I fancy, that Adippe is more alert upon the wing and difficult of capture than Aglaia; and the latter seems partial to places near the coast, even if exposed.—*J. R. S. C.*

VIPER SWALLOWING ITS YOUNG. — There are several mysteries in Natural History which require clearing up: sea-serpents, hybernation of swallows, long imprisonment of frogs, and, among many others, the power of the Adder (*Pelius Berus*) to swallow its young in time of danger or surprise. Unfortunately, in most instances, the deed is witnessed by an unskilled observer; but there is a mass of evidence from skilled naturalists, added to the larger mass from sportsmen, gardeners, game-keepers, and those given to rural walks, that it almost convinced me, who am inclined to be a sceptic. With no time for sport or country rambles, I have a local reputation of being a "curious" man, and so it is my good hap to be referred to in matters of doubt. From early training and profession, I may say that I am something of a comparative anatomist and a skilled observer. But to the fact. On September 15th, 1872, an adder was brought me by a friend, who had killed it by a blow of a lithe stick on the head. It would have been valueless and thrown away, but that I noticed its protuberant belly. Willing to know what it had been dining on, I made a *post-mortem* examination, expecting to find some field-mice or shrews. My surprise was great at finding, on careful incisions, six young adders lying at length *in the stomach*. On further examination, I found *the oviduct intact*. My friend did not witness any swallowing of the young. The mother was 18½ inches long, and the young ones varied from five to six inches in length. —*Thomas Q. Couch, F.S.A.*

ZOOLOGICAL PROBLEMS.—"At the last meeting of the British Association, the President, Dr. Carpenter, suggested that the reason why the coral-reef animals could not live at a greater depth than twenty-five fathoms, was that the temperature below that depth was not congenial to them. Hence, he made it a question of temperature, not of pressure, as to what depth these lowly-organized creatures might exist at. It follows from this, that in areas where the proper temperature extends to a much greater depth than twenty-five fathoms, as in the Red Sea probably, these reef-building corals ought to be found in the living state. When in the 'Coral Sea,' as it is appropriately called, the *Challenger* will make experiments, with a view of determining whether it is pressure or temperature which regulates the vertical distribution of these animals. There is little doubt that this part of the voyage will be a prolonged one, for the shallow-water animals of the shores of New Guinea are to be examined, and compared with those living under similar physical conditions off the opposite coasts of North Australia. By a true comparison of these it will be possible, approximately, to fix the period when New Guinea and Australia were disjoined; for this rule holds good in geographical zoology, that islands which are separated from adjacent mainlands by *shallow* seas have invariably the same fauna and flora; whilst islands separated by *deep* seas have their indigenous animals and plants dissimilar; the deduction being that deep water indicates a long period of separation, during which the animals and plants have relatively altered; whilst a shallow sea is equally a proof of a recent zoological change. If we apply this principle to the British islands, and compare our fauna and flora with those of the Continent, we shall find the latter rule holds good; whilst, if we compare those of the Azores to the African types, we equally prove the applicability of the former rule, the intervening sea sometimes reaching a depth of 30,000 feet."—*J. E. Taylor, in "Cassell's Magazine" for June.*

WHITE STORK IN SUFFOLK. — Mr. Rope, of Leiston, has just published the following:—"For the last day or two we have had a rare visitor on our marshes, in the shape of a white stork (*Ciconia alba*). He is a most conspicuous object, and may be seen from a great distance. We watched him on May the 21st for a long time with a good glass. He appears to be in good plumage, and is very wary, not allowing us to get at all near him. When flying, he was followed and mobbed by some pee-wits, who evidently looked on him as a strange intruder. As there happened to be a heron on the

wing at the same moment, we had a good opportunity of comparing the flight of the two birds. The stork looked the larger of the two, and his wings appeared to be longer and less rounded than those of the heron; the different manner of carrying the head, too, was also very striking—it was poked out in front of the bird, but not stretched out so straight as that of the swan in flying." [Since the above appeared, another paragraph has announced that the poor visitor has been shot at Potter Heigham. Long may the "sportsman" who did the deed rejoice over such an act of bravery!—Ed. S.G.]

Venomous Caterpillars.—Mr. A. M. Festing contributes the following note to *Nature*:—"Between the years 1857 and 1862, when stationed at Belozi, the capital of British Honduras, I made the acquaintance of a so-called venomous caterpillar, which was held in very great dread by the natives, who averred that 'its *bite* always produced fever.' Knowing their superstitious habits, and that, as far as my knowledge of natural history went, there did not exist a caterpillar capable of producing a wound of any kind by *biting*, I resolved to test the truth of the assertion. Accordingly, and to the intense horror of the bystanders, I took one in my hand from a tree that was literally covered with them. It was about 1½ in. long by ⅜ in. thick, of a blue-grey tint, and, in addition to the fine long hairs which clothed it, was armed with clusters of short spines. These clusters were formed into rows, and contained about a dozen spines each. After a careful examination, I came to the conclusion that they were most likely to be the seat of the venomous propensities attributed to the insect, so I struck the back of my right hand against them two or three times, to see what would be the effect. They were very brittle, and broke off as they entered the skin. I thought no more about it till about an hour had elapsed, when I experienced in the wrist a dead pain, which gradually extended to the arm-pit, followed by a swelling of the glands. For the whole day the pain was sufficient to render my arm useless; hence I thought that there must be some poisonous secretion in the spines, for the irritation caused by fine points, even if barbed, would scarcely produce such an effect. The pain died away in the evening, unattended by any feverish symptoms whatever, for I was in excellent health at the time. Next day I examined several of the spines under the microscope; they were not barbed, but hollow, and under pressure emitted a colourless transparent fluid, to which I attributed the poisonous qualities which caused me so much pain."

The Flight of Birds.—Mr. J. Guthrie, of Cape Colony, writes to ask for naturalists to assist, by observation, in throwing light upon the following points. He says:—"Some time since I had occasion to ascend a mountain in the neighbourhood. The wind was blowing over the ridge-like crest of the mountain with a velocity of, I should say, ten or twelve miles an hour, sweeping with increased rapidity through certain transverse gorges cutting the ridge at right angles. In one of these I observed a hawk hovering in search of prey. In the midst of this rapid air-current the bird remained apparently *fixed* in space, without fluttering a wing, for at least two minutes. After a time it gently changed its position a few feet with a slight motion of its wings, and then came to rest again as before, remaining apparently as motionless as the rocks around it. From my nearness to it a change of position of an inch would have been clearly visible, and yet, except when it seemed to desire to change its point of observation no motion of any kind could be detected. How is this to be accounted for? Does a bird possess the power of giving an extremely rapid tremulous motion to its wings invisible even at a small distance, similar in its nature to the wing-vibration of certain insects, which, as any one may have noticed, have a similar power of apparently fixing themselves in space over a flower, for example, notwithstanding a considerable amount of motion in the air in which they are suspended?"

BOTANY.

Variation of Colours in Flowers.—The change in the colours of white flowers noticed by Mr. Stratton in Science-Gossip for June with reference to the *Convallaria majalis* is no doubt difficult to account for; but does not the fact that they are sometimes changed in cultivation, as in the common daisy (*Bellis perennis*), becoming as it does a deep red, lead to the supposition that it may be attributable to the change of soil? At the same time it would be difficult, on the same theory, to account for the variation in the same plants growing close together. I have found, for instance, in the Swiss mountains, the *Gentiana acaulis* white, though very rarely (rarissimè alba—Gaudin, "Flora Helvetica"), growing by the side of others of the ordinary bright blue colour, with others of various shades between the two. Again, I found in a grove at Geneva, on the banks of the Rhone, the common wood anemone of a decided pink colour growing with others perfectly white, together with the pretty *Anemone ranunculoides*, which was very abundant, in very light soil, formed apparently by the decayed leaves of ages. Verlot says that flowers which are normally white rarely vary into any other colour. The daisy is an instance of such variation, and the wood anemone under cultivation might perhaps be the same. Since writing the above I have seen a Florist's Catalogue of Plants for sale, printed for circulation

in the trade, in which are three varieties of *Convallaria majalis;* viz. alba, rubra, and rosea. I am told that the coloured ones may probably be seedlings, as seeds from the same plant will occasionally produce plants with colours differing one from the other. Can this be accounted for, and can hybridation be the cause of it?—*T. B. W.*

The Babylonian Willows.—Observing in your number for the current month a quotation from *Silliman's American Journal* to the effect that Karl Koch had settled, by recent research, the question of the "Gharab" (Psalm cxxxviii. v. 2) *against* the weeping willow, and that, therefore, Linnæus' specific name for that tree (*Salix babylonica*) ought to be abandoned in favour of that of Mænchc—*S. pendula*, I think it may be pertinent to the matter if I remark that the true weeping willow grows on the banks of the Jordan, where I have myself gathered specimens. Hasselquist also mentions it as growing there. I have seen it also overhanging a stream in a valley of Upper Galilee, near Safet. Canon Tristram, in his "Natural History of the Bible," says: "The weeping willow (*Salix babylonica*) is frequently found near the coast, overhanging wells and pools. There is a conspicuous tree of this species over a pond in the plain of Acre, and others in the Phœnician plain. It is also common on the banks of the river Barada (Abana), near Damascus." The fact, however, of its occurrence in the semi-tropical climates of the Jordan, where, as Dr. Hooker says, "the flora is that of the whole dry country as far east as the Punjab," sufficiently disposes of the argument that "its hardiness indicates a cooler climate than that of Mesopotamia." Tristram found several other Salices in the Jordan Valley,* as *S. octandra*, and one resembling *S. viminalis;* and adds, "in some of the wadys by the Dead Sea, where the stream is perennial, we found a very fine species of willow flourishing abundantly. . . . . These wadys were the only places in Palestine where we found the willow the predominant tree, and where it continuously lined the banks of any stream." Poplars do indeed occur also in these countries, and I have seen the *Populus euphratica* growing plentifully by the Jordan. Hooker says of this tree that it is "found all over Central Asia, but is not known west of the Jordan." It is not necessary to prove that the *Salix babylonica* grows in Mesopotamia at the present day; probably the changed conditions of the climate, owing to its now sparse population, have rendered its survival impossible. But from what is said above, I think it will be evident that a tree which still flourishes in Damascus and the Jordan Valley, may with great probability have flourished in Babylon at the time of the Jewish captivity.—*Edward Atkinson, F.L.S.*

* Other writers mention also having found the *S. ægyptiaca* here.

A Useful Hint.—The *Garden* says: We are indebted to Mr. Pynaert for the discovery that *Lilium auratum*, besides being a beautiful plant, is a grand specific against house-flies, and that a single specimen of it in an apartment will keep it clear of these troublesome insects.

Double Flowers and Perfumes.—The double white thorn and the double pink thorn have no scent; but the double gilliflower and the double pinks and carnations retain their scent in spite of the conversion of the stamens into petals. Will any correspondent kindly inform me to what extent this prevails, and the reason?—*J. T. C.*

Extirpation of Rare Plants.—This sad work is still increasing, and ought to be stopped, especially as some provincial societies persist in offering prizes for the largest and best collections, and "express the hope that numerous competitors may be found in the families of the members." And now we are threatened by the Botanical Record Club, according to Mr. Edward Atkinson, who makes some judicious observations on the subject in Science-Gossip, June 1, 1873, p. 142. The absurd notion seems to prevail that Botany consists in the getting together, no matter by what means, of as many specimens as possible, especially of the rarer species, and calling them by their scientific names; and this without the least pretension to a knowledge of their intimate nature, as if mere physiognomy were quite above physiology. Accordingly, money is offered to encourage a system which, so far from being a test of the knowledge of the candidates, or likely to direct them in the right road for its pursuit, only tends to foster mere vanity, and to lead the mind from the true path of science. This last and most essential point might be gained, and the knowledge of the competitors tested, far more effectually by means at once easy and rational, and without the least damage to those rare plants which it is our duty to protect and preserve. For example: displays of the generic characters of the large and useful order of Grasses would at once show the botanical acquirements of the candidates in this department; and observations on the characters afforded, in different orders, genera, and species, by the pollen, by the cells of the epidermis and its appendages, would be equally eligible; and, indeed, numberless other such useful and suitable subjects might be mentioned, of which raphides and other plant-crystals would afford a wide field for the exercise of the diligence and improvement of the student. Many of our most eminent botanists have long been protesting against the onslaught on our most cherished wild plants. But all in vain: for our societies still encourage the havoc. Thus,

in the latest report of such a respectable body as the "West Kent Natural History, Microscopical, and Photographic Society," the "Council's Report" (p. 19) offers prizes which may lead to still further destruction; and, under such temptations, cases have occurred (and may be still further encouraged) in which collectors, in their anxiety to defeat their competitors, have destroyed such precious plants as could not be conveniently taken away. And we have been too long familiar with the rapacity of mere traffickers. I have already invoked the aid of *Nature*, May 22, 1873, to arrest the evil, and hope that the good offices of SCIENCE-GOSSIP will not be wanting.—*G. Gulliver, Canterbury.*

QUILL-WORTS.—I have received two specimens of the Guernsey *Isoetes*, which is generally supposed to be the *I. histrix;* they are very much smaller than the smallest I met with in Algiers, and are *totally wanting* in the peculiarly characteristic *spines* noticed in SCIENCE-GOSSIP for March last. They have not even the *teeth* of the *I. Duriæi.* If all are equally minute and spineless, they would appear to be, not merely a *variety* of the *Isoetes histrix,* as suggested by Mr. Berkeley in the "Treasury of Botany," but a *distinct species.* The base of the fallen leaves has the same shining black horny character as the Algiers plant, the essential difference consisting in the total absence of spines.—*T. B. W.*

ALPINE PLANTS.—The year before last I brought home from Switzerland a plant of *Gnaphalium leontopodium,* better known to tourists by its German name, "Edelweiss," and by its English name, "Guides' plant." It took one year to recover from the shock of leaving its mountain home, and it is now in full vigour, showing six corymbs of flowers. Many persons who try to grow Alpine plants think they sufficiently imitate the natural condition of their pets if they plant them in a rockery, and expose them to the frost and cold winds of an English winter. Consequently they fail. The natural condition of Alpine plants in winter is to be snugly protected from excessive cold by a blanket of thick snow. When this is removed, they find themselves suddenly exposed to the direct rays of a scorching sun, being at the same time plentifully supplied with moisture, derived either from the melting snow or from rain and mists. My treatment was to plant my specimen in a pot; containing a compost of leaf-mould, peat, and sand, to keep it in a sheltered cool frame until it began to show signs of growth; and then to place it, fully exposed to the rays of the sun, in a warm greenhouse. A similar treatment suits most Alpine plants; but when thoroughly established, they may be planted out in a south aspect, when they will flourish for years, provided that they are well watered in summer and artificially protected in winter.—*C. A. Johns.*

GEOLOGY.

"THE GLACIATION OF THE NORTHERN PART OF THE LAKE-DISTRICT."—A paper on this subject was recently read before the Geological Society of London by J. C. Ward, Esq., F.G.S. The author stated the leading questions to be settled by his investigation of the northern part of the Lake-district as follows:—The fact of the glaciation of the district being granted,—and of this he adduced abundant evidence, the questions that arose were whether the glaciating agent worked from north to south, whether it came from within or from without the district, and finally, whether the agent was floating ice, a system of local glaciers, or an unbroken ice-cap. As the result of his investigation, he maintained that there is no evidence that a great ice-cap from the north ever swept over this district. The ice-scratches trending along the principal valleys, but sometimes crossing watersheds, indicate a great confluent glacier-sheet, at one time almost covering a great part of the district, the movement of which was determined by the principal watershed of the Lake-district. In the part of the Lake-district under consideration the ice, during its increase, carried forward, from south to north, a great quantity of rocky material. There are no signs in the district of the occurrence of mild periods during the epoch of primary glaciation, but the author thought that the climate had probably become moderate before the great submergence of the land commenced. The author noticed the effect of the submergence upon the results of previous glacial action, and maintained that when the land had sunk 800 or 900 feet there was a recurrence of cold, and boulders were transported by floating ice. Until the submergence reached 1,500 feet there was no direct communication between the northern and southern halves of the Lake-district except by the Straits of Dunmail Raise. From the directions which would be taken by the currents in the sea at this period, it would appear that boulders may then have been transported by floating ice in some of the same directions as they had previously been carried by glacier-ice. The extreme of submergence appeared to have been about 2,000 feet. The author further maintained that on the re-elevation of the district there was a second land-glaciation, affecting the higher valleys and clearing them of marine drift.

SCENERY OF THE LAKE-DISTRICT.—It should have been stated that Mr. Ward's paper, published in our last issue, on the "Scenery of the Lake-district geologically considered," was read before

the Brighton Natural History Society on the 14th of February last.

Geology of Indiana.—An attractive volume, containing the third and fourth annual reports of the Geological Survey of Indiana, made during the years 1871 and 1872, has just been published by the United States Government. It has been carefully compiled by Mr. E. T. Cox, the State geologist, who has been assisted in his difficult task by Professor John Collett, Professor B. C. Hobbs, Professor R. B. Warder, and Dr. G. M. Levette. The Report deals chiefly with the extent and stratigraphical formation of the coal-measures in Indiana. The characteristic fossils of the different beds are given, and we are surprised to find so many of them identical with those of our own carboniferous rocks, such as *Productus punctatus*, *P. semireticulatus*, &c., associated with *Lepidodendra* and other land plants, which make these Indianan strata look like the Scotch coal-measures. The economic geology is well worked out, in valuable detail, and this information, supplemented by the excellent sections and maps, published on a large scale, must render this volume exceedingly valuable to the inhabitants of Indiana. The upper and lower Silurian rocks are also detailed, and their fossils catalogued. We congratulate Mr. E. T. Cox and his colleagues on their exhaustive and useful production.

The Boiling Springs of New Zealand.—Mr. C. M. Ollivier has written an interesting account of a visit paid to these springs, which are situated at the head of Rotarua and Rotamahana lakes. The hot water and mud are greatly charged with sulphur, and the area where the boiling springs are situated is in a constant state of commotion, resembling the "mud volcanoes" described by Humboldt. Some of the springs throw up boiling water to the height of several feet. The largest of the springs rises out of a conical mound fifty feet in height, the sides of which are covered with siliceous incrustations. Here an intermittent rise and fall of hot water is constantly going on, rising to the height of thirty or forty feet. Mr. Ollivier has also given a graphic description of the terraces of the Tarata spring, formed chiefly by stalactitic matter.

NOTES AND QUERIES.

The Wild Artichoke.—Can any reader of Science-Gossip give information as to the origin of the garden artichoke (*Cynara scolymus*)? I once heard the question asked by one of the first botanists of Geneva (Mons. Reuter), but no one could throw any light upon it. In Loudon's "Encyclopædia of Plants" it is said to be a native of the south of Europe, and of Barbary and the south of Europe in the "Treasury of Botany;" but I have never met with it in any *local* Flora. The *Cynara horrida* is abundant at Malta, where the natives eat the fleshy receptacle, as we do with the garden artichoke. May it not have been the origin of the garden plant *altered by cultivation?* The localities for *C. horrida* given in Wood's "Tourists' Flora" are Civita Vecchia and Sicily, but he probably refers to *Citta* Vechia in Malta, as I never met with *C. horrida* in Italy.—*T. B. W.*

The Oldest Tree in Britain (p. 91).—This can only be a matter of conjecture, as history does not furnish us with unmistakable references to certain trees, which would secure their identification; and size or appearance gives no conclusive evidence. And supposing a tree to have been felled, a calculation based upon the number of concentric rings in the wood gives uncertain data. It is probable that some oaks in Britain are more venerable than even the oldest of our yews. One in Selcey Forest, which is now, I believe standing, has been referred to as being the most ancient tree in Britain; but the statement is *ex parte*. Several oaks, which might have rivalled this tree, perished in various places during the first half of this century. In spite of assertions to the contrary, very few of those competent to judge believe that there are British trees existent whose age exceeds a thousand years.—*J. R. S. C.*

Poisonous Plants.—The Chester children were poisoned by *Œnanthe crocata* ("Hemlock, Water Dropwort"), and in the *Gardener's Chronicle* for July 13th, 1872, there is a full account of the case, with a wood engraving of the poisonous tuberiform roots, taken from a plant sent by Mr. Brittain, the medical man under whose care the unfortunate lads were.—*W. G. S.*

Black Smut.—Will you oblige me by mentioning in your next number the name of the black "smut" that is so apt to cover the leaves of orange and some other greenhouse plants? I find it difficult to examine under the microscope.—*F. G. M.*

Pearls.—Can any of your readers tell me the real reason why pearls so often turn black? A friend of mine has a ring, supposed to be valuable, some of the pearls in which have become almost quite black. Is it because they are not good?—*R. M.*

The Hydra (p. 115).—May not the paralyzing properties of the hydra be due to a narcotic fluid which it ejects when anything comes in contact with its thread-cells, thus causing the ejection of the contained filament? Animals would recover from this in due time, but a sting might prove fatal. It seems unlikely that any of the inferior animals could feign death.—*John Hopkinson.*

The Cuckoo (p. 117).—"Our feathered friends" have doubtless an antipathy to the cuckoo because it is parasitic, robs other birds of their food, and uses their nests.—*John Hopkinson.*

Do Fishes move after Death? (p. 119).—In the account of the genus *Gobius* in the "English Cyclopædia" the following passage occurs:—"The species of *Gobius* are very tenacious of life, and are capable, like their neighbours the blennies, of living some time out of water." The fact of the goby being on its back, though not quite dead, may be owing to the *Acanthopteri*, to which sub-order the *Gobiidæ* belong, having a swimming-bladder without a duct.—*John Hopkinson.*

Winter Habit of Fleas.—"J. R. S. C." will perhaps feel interested in knowing that on one occasion the writer came upon a colony of fleas in their winter quarters on a piece of dimity that formed the sides of a sofa-bed not in use. Each insect had a cell to itself shaped liked a cocoon, about one-eighth of an inch long, and a sixteenth in the middle width. The insects were not torpid, but showed their usual activity by escaping through a longitudinal crevice in the cocoon one after the other, as if they were all simultaneously alarmed at the moment of discovery, though each cell was separate from its neighbour! How the insects continued to work up sufficient fluff off so hard a cotton fabric as dimity, and mould it into close-fitting cocoons, is a puzzling question.—*W. B. Fowey.*

Ants' Eggs.—Would any one kindly inform me how to prepare the pupæ of ants for storing for winter? After collecting them, are they dried in the sun or in an oven? Also are they given to birds simply in the dried state?—*H. S. W.*

Wild Tulip.—It may perhaps interest the readers of Science-Gossip to learn that the wild tulip (*Tulipa sylvestris*), said to be rare, or at least local in England, and hardly ever seen in Somerset, was found the other day near Combe Hay, a small village near Bath. One afternoon in the Easter week I received five specimens of different sizes. I have only to add that, on its becoming known that they had been found, there was so much inquiry about the locality and such a run after them, that now there is not a single specimen to be found.—*H. Macco.*

Gum Dammar.—Your correspondent Alfred Allen can easily dissolve the above resin by melting it first in a sand-bath, and gradually adding the turpentine he requires: the solution is made at once. *Benzole*, not *Benzoline*, is used as another solvent. Mere powdering and well shaking up in the gold will effect a solution in this case.—*J. Wiggin, Ipswich.*

Poisonous Plants.—In reply to the case of the two children belonging to the Chester Workhouse who were poisoned some time ago by partaking of the root of some plant, the name of which "Eliz. Edwards," in your last issue, desires to know, I can only say, on the information of an unbotanical friend of mine, residing in Chester, that the plant in question was stated in the papers to have been the wild celery (*Apium graveolens*); and that this plant does grow there, alongside the river, I can testify: so if uprooted about such a part, it becomes exceedingly probable that injurious, if not fatal, effects would follow from the eating of it; and these again varying very much of course upon the time at which the plant may have happened to be got. I may as well add here, for the information of such as may not know it, that it is only through cultivation and blanching that the celery we use is rendered edible, of which the wild is the origin.—*John Harrison, Newcastle-on-Tyne.*

Ipswich Amber.—I presume your correspondent "C. D.," in referring to "Ipswich amber," really speaks of that manufactured at Trimley, a village within two miles of the coast, and distant 10 miles from Ipswich. I know that a considerable number of crosses, bracelets, and other personal ornaments, are, and have been, made there for the last 30 years by one family, who procure the amber from poor persons picking it up after wintry storms on the coast between Landguard fort and Aldborough. I myself possess a piece 4 oz. in weight procured from the same source, and have purchased many pounds of it at various times. If I am not mistaken, the late Mr. R. D. Alexander's famous piece, said to be the largest in England, was picked up in the same locality.—*J. Wiggin, Ipswich.*

Microscopic Postal Cabinets.—I think that Mr. Alfred Atkinson's proposal, at page 111, is a very good one; and, in default of a better man, should be most happy to become a member of such a society.—*J. R. Davies.*

Field Clubs in London.—Will you kindly inform me if there are any "Naturalists' Field Clubs" or societies of that description in the south or west of London, and how I could obtain full particulars about them?—*J. G.*

Curious Nesting-place.—The fingers of the southern dial of the clock of St. John's Church, Heaton Mersey, were stopped for three or four days, a week or two ago. On an examination into the cause, it was found that a sparrow had built its nest in the spurr-wheel connecting the fingers with the dial.

Poisonous Plants.—In reply to Miss Edwards in Science-Gossip, p. 119, I believe the root eaten by the children at Chester, was the root of Water Dropwort (*Œnanthe crocata*), a very poisonous plant, and far too common in boggy places in Cheshire. Why it was called wild carrot I cannot conceive, unless it is because all umbelliferous plants are named in country districts either parsley, carrot, or celery.—*J. R.*

The Camberwell Beauty.—I write to inform you that I have just added to my collection a very characteristic specimen of *Antiopa*, caught by a lady friend, close to my house at Malvern. The outer border is plain white, after the common description of the English specimens; the other markings are rich and natural.—*Charles Grindiod.*

Nightingales and Tortoises.—1. It has been asserted that nightingales will neither sing nor remain in a deer-park. Is this statement correct? 2. Tortoises are supposed to be useful in gardens in destroying snails and slugs; but ours has been caught in the act of devouring the young shoots of sweet peas, green peas, &c. Are they known to be so destructive to vegetation?—*E. M. P.*

Testacella Maugei.—In March last I had three specimens of *Testacella Maugei*, Fer., brought me by a friend; and being desirous of seeing them crawl about, I placed them upon a damp savoy-leaf, and bathed them with cold water, using a camel-hair brush. Shortly afterwards they began to expand and move about, but they did not distend themselves, as represented in drawings of them. One of them, after being so bathed, gave out air from under the front edge of the shell with a fizzing noise, forming a number of air-bubbles on the back of the slug, similar to what is termed cuckoo spittle, only larger. Presently the same slug began to pass from its mouth one of its own species over half an inch long; after a short interval a piece of worm; again another piece of worm, and then another piece of worm. Each piece of worm was over half an inch in length, and a quarter of an inch in diameter. It was something

novel to see a creature voiding its excrement by its head, the tentacles standing out, and the mouth so much distended, together with the heaving and contortion of the creature, as ring after ring of the piece of worm passed upwards and outwards, that I could not help smiling at the very grotesque and singular appearance of the slug under the circumstances.—*G. R.*

Names of the Missel-Thrush.—In answer to a correspondent who wishes for some little information relative to the Missel-thrush, I beg to send the following:—First, in answer to the question "Whether the name Thrice-cock is to be found in print, and if so, in what book?" Mr. Garner, F.L.S., Stoke-upon-Trent, in his "History of Staffordshire," page 274, speaks of the *Turdus viscivorus* as known by the various names of missel-thrush, sprite, storm-cock, and thrice-cock, but gives no reason why the latter name is applied, as it usually is, in most of the midland counties. Mary Howitt, in her book of "Birds and Their Nests," speaks of *Turdus viscivorus* as known by different names, in different parts of the country, viz., missel-thrush, storm-cock, thrice-cock, and in Wales as *Pen-y-llnyn*, which means the head or master of the coppice. The missel-thrush is the largest of our British song-birds; it remains with us through the year, not being migratory, excepting in so far as it moves off in considerable flocks into Herefordshire and Monmouthshire for the sake of the mistletoe, which abounds in the orchards there, on the viscous berries of which it delights to feed; whence it has obtained its familiar name of missel, or mistletoe-thrush. It is the earliest harbinger of spring, the first singer of the new year; its clear, rich voice may be heard often amidst wild winds and winterly storms; whence also its familiar name, storm-cock. In the midland counties it is called thrice-cock; but why, I know not. A pair of missel-thrushes build annually in the plantation adjoining our house; and on approaching their nest after they have young ones, the parent birds attack all intruders in the most savage, determined manner, uttering a loud, screaming noise, very like a shriek, as an expression of their displeasure. At other times they are a shy bird, and almost unapproachable. Nor do you ever see them near the house; but in the early spring, while they are breeding, their nest is built in the fork of a tree, near houses and in towns. I shall be very glad if others will take notice of your correspondent's inquiry, and afford all the information they can in answer to his query relative to the derivation of Thrice-cock.—*Elizabeth Edwards.*

Missel-Thrush. — In answer to "R.R.R.'s" letter, concerning the "Missel-thrush" being called "Thrice-cock" in certain of the midland counties of England, I have never heard the name before, and do not know whether it is to be found in print; but I think it is very likely so called from the resemblance which its peculiar cry has to the word thrice.—*J. L. J.*

The Missel-Thrush. — Your correspondent "R.R.R." will find the Missel-thrush called Thrice-cock in the index of provincial names at the end of Johns' "British Birds in their Haunts;" but in the body of the work no explanation of the term is given. In Johns' excellent work there is a far larger collection of local names of birds than in any work in the language, but, singularly enough, a name by which the missel-thrush is generally known in Westmorland and Yorkshire is not given; viz., Jer Cock.—*J. S. Metcalfe.*

Curious Place for a Chrysalis.—I have in my possession a portion of an umbrella-handle, in the very heart of which is a pupa, or rather the shell of one. The owner—to whose kindness I am indebted for it—whilst talking one day to a friend, leaned somewhat heavily on his umbrella and broke it in half, thus discovering the strange occupant. The holes made by the larva in the stick, which is oak, had been carefully stopped up, rendering any emergence from its "living tomb" impossible. I presume the chrysalis is that of the Leopard Moth (*Zeuzera æsculi*).—*Joseph Anderson, jun.*

Songs of Birds.—I should esteem it a favour if some one of your contributors could describe the respective songs of the nightingale and blackcap, so as to make it possible to distinguish between them. It is certain that the two are to a great extent popularly confounded. May I also ask for the title of some good book descriptive of the songs of British birds?—*P.*

Cossus ligniperda. — In the paper by Mr. Spicer in last month's number (p. 130), there is an erroneous statement respecting this insect. He says: "Pliny's cossus was also an oak-borer, which the goat-moth is not." Certainly the *moth* may not be an oak-borer, but its larva most decidedly is. In this locality I know of one tree which has been killed by this larva, and another close to it that contains, at this time, dozens of the caterpillar of various ages.—*E. B. Kemp-Welch, Bournemouth.*

Swans and Cygnets.—This evening, as I was walking by the Thames between Windsor and Staines, I saw two swans—one having two cygnets on its back between the wings, and another on the tail. Is it usual for swans thus to carry their young? They were going up stream, so that was most likely the cause, the young ones probably not being strong enough to swim against the current.—*J. H. Alchin.*

Food of the Snake.—Query—Does the snake swallow toads as well as frogs? During a ramble in August, I surprised a large snake and half-grown toad together near a wall. On my approach the snake glided off, and disappeared in a hole of the wall, leaving the toad behind, which appeared stupefied, fascinated, paralyzed, and never stirred a limb, though its hind-legs were stretched out on each side in the most unnatural manner. The whole front part of the body, and part of the back, was smeared with a slimy fluid, as if it had been swallowed thus far. The poor toad remained fixed in the same position for some time, but at length, as if it were collecting its faculties, it moved a little, and then slowly crawled a short distance off. To all appearance, the snake had attempted to swallow the toad, but had rejected it as an unpalatable morsel, or perhaps my sudden appearance prevented the snake's ideas from being fully carried out.—*W. H. Warner, Kingston, Abingdon.*

Starling.—A pair of starlings build every year in the side of this house, and rear fine broods of cackling young. The old birds work most industriously, especially towards the evening, to satisfy the appetites of the nestlings. Watch in hand, one night I noted the time elapsing between the visits

of the parents to the young with mouthfuls of grubs or worms in their bills, and I found that one or the other would alight near the nest thus laden every two, or at most three minutes. — *W. H. Warner, Kingston, Abingdon.*

ZONITES GLABER. — Will any of your correspondents kindly inform me the date of the year when *Zonites glaber* was added to the British fauna? —*A.P.*

LADYBIRD (*C. septem-punctata*). — In breeding this insect from the chrysalides collected from the hedges in summer, I find the pupa of the male (or smaller insect) is black, with a few orange spots, and that of the female orange, with two rows of small black dots down the middle. Books that I have consulted only mention the pupa of the male. —*W. H. Warner, Kingston, Abingdon.*

LONGEVITY OF THE OWL.—Can any of your readers give me information as to the longevity of the owl, especially of the tawny and white species? I have a notion that, if undisturbed, they are long-lived. I need this information for a purpose. —*T.Q.C.*

THE GREASY FRITILLARY (*Melitæ artemis*).— Until within the last three or four years I knew of a spot where I was certain of meeting with this insect. Now, from some unexplained cause—at least to me—it has completely vanished. Of late cows have been turned into the pasture to graze. Could it be possible that they have destroyed the pupæ? though I should say this could hardly be the case, as *galathea* still abounds there in great profusion. Does this butterfly, like some others, such as *edusa*, *hyale*, and *antiopa*, disappear for some seasons?— *Joseph Anderson, Jun.*

THE COLE-TIT.— Mr. Edson, of Malton, has brought to our notice a very singular and interesting occurrence in connection with the Cole-tit. Mr. Watson, the stationmaster at Rillington Junction, had, a few years ago, a hive of dead bees, and the old hive was hung against the wall of the house, as any one would hang his hat upon a hat-peg. There was but a very small aperture, but through this a pair of Cole-tits entered, built, and brought off nine young birds. This has been repeated four times, the progeny, thirty-six in number, have some of them come back to Rillington station to build. This year the old birds have for the fifth time occupied the old bee-hive, but there were only eight eggs, one of which got broken. There are now seven young birds in the nest, and the removal of the hive where the nest is built only causes the old bird to fly off, if strangers are near, to which she returns immediately. The bird is one of the most interesting of the Paridæ, is comparatively rare in England, though tolerably common in Scotland, frequenting plantations of pine, fir, &c., which seems everywhere to be its favourite habitat. The annual visit of the birds to an old bee-hive, hung on a nail in a brick wall, is therefore all the more remarkable.

THE HARVEST BUG.—Referring to J. Buckman's sufferings from harvest bugs (SCIENCE-GOSSIP, p. 45, February), I resided a few years ago in the country, and suffered at first very severely, generally from the 20th July to the 24th of August. After trying scores of remedies, I was led to examine my person night and morning. I then applied a drop or two of iodine, covering the spot with a bit of the common linen adhesive plaster about the size of a sixpence. In 1867 I had at one time more than 100 of such on my arms and legs. The insect being armed with spines lying backwards on its body, cannot, on entering the skin, return. I presume, rubbing a bite crushes the insect and causes the powerful irritation. I obtained a small bottle of iodine, wrapped a little cotton wool round the head of a pin, ran the pin into the cork of the bottle, allowing it to lay in the iodine: the wool will contain sufficient for each application.—*W.B.*

THE BOTANICAL LOCALITY RECORD CLUB.—In reply to Mr. Atkinson, I may state that the lists, &c., published will be distributed to members only, and great care will be taken that none shall be sold or get into the possession of mere collectors, &c. I believe that all the present members are true botanists,—those who would not exterminate a plant for the sake of drying it, and calling it a specimen. Many of our rarest plants are to be obtained only at the risk of falling down high cliffs, and no collector would care to risk his neck for the sake of obtaining a few specimens. And further, in plants of great rarity, the localities will be given so as not readily to be found. Mr. Atkinson will perhaps then say: "Of what use is the club if the plants cannot be found?" The answer is: "Any member may obtain the exact locality on making application to the recorder, on condition that he shall not abuse the confidence reposed in him." It is by these means that the sinister plans of collectors and exterminators will be defeated, and the *bonâ fide* student and botanist assisted. Therefore I think that the danger seen by Mr. Atkinson is not much to be feared. Mr. Atkinson does not seem to see the importance of correctly ascertaining the geographical and geological distribution of plants. I think Mr. Watson is the only one who has written on this subject. He has devoted his entire life to this work, and his series of invaluable works show how ardently he has laboured. Instead of giving the distribution in provinces and counties, the club intends to give the localities in those provinces and counties. Thus in course of time the club reports, &c., will become a trustworthy flora of the whole country.—*Thomas Bates Blow, Welwyn, Herts.*

BOOKS RECEIVED.

"Chronos, Mother Earth's Biography." By Wallace Wood, M.D. London: Trübner & Co.

Third and Fourth Annual Reports of the Geological Survey of Indiana. By E. T. Cox.

Maps for ditto. 1872.

Fourth Annual Report of the Trustees of the Peabody Academy of Science for 1871.

"The Lens." April, 1873.

"Boston Journal of Chemistry." May, 1873.

"Les Mondes."

"Canadian Entomologist." Nos. 3 and 4, vol. v.

"Monthly Microscopical Journal." June, 1873.

"The American Naturalist." March and May.

"The London Saturday Half-Holiday Guide."

"The American Agriculturist. June, 1870.

COMMUNICATIONS RECEIVED UP TO 14TH ULT.—J. T.—J. G. M.—J. S. S.—C. A. J.—W. G. S.—S. H.—F. E.—J. H. L. —J. T.—A. C. T.—A. H. W.—R. M.—W. L.—W. P. H.— C. L. J.—H. L. J.—W. H. B.—E. W.—J. C. S.—W. D. R.— E. C.—B. T.—H. P. M.—T. B. W.—F. K.—T. S.—W. B.— E. E.—T. Q. C.—J. S. T.—G. R.—J. B. J.—E. M. P.—J. P.— E. H.—J. C. W.—W. N.—W. W. E.—J. S. M.—J. A., jun.— E. A. W.—G. T.—E. A.—A. P.—E. B. K. W.—W. H. W.— R. P. P.—E. H. G.—J. H. A.—J. H.—T. B. B.—A. E. S.— W. W. S.—W. E. H.—M. A. H.—J. L. J.—E. L.—T. R.—F. D. —A. W.—W. L. S.—C. J. M.—H. M. J. U.—W. T.—H. B.— A. H.—H. F. M.—R. A. P.—S. T. P.—E. W.—T. W.—N. M. R. —L. S. S.—H. H.—F. T. M.—W. J.—F. A.—J. S., jun.— E. H.—D. G.—J. W.—W. E. S.—T. B. B.—J. A. jun.—J. H. S. W. M.—H. G., &c.

NOTICES TO CORRESPONDENTS.

S. H.—Lindley's "School Botany" (1839) is too old to begin the study of a progressive science with. Get Masters' "Botany for Beginners," and Cooke's "Manual of Botanic Terms."

F. EVERSHED.—The work containing the fullest information on the folding and arrangement and general morphology of leaves, &c., is the second volume of Spencer's "Principles of Biology."

A. H. WOOD.—You will find full instructions how to prepare the skeleton leaves of plants in an article in SCIENCE-GOSSIP for February, 1872.

W. D. R.—The capsules and seeds are not sufficiently ripe to be called fruits. Double-flowered *Cardamine pratensis* is not rare. You may generally meet with it in any rich meadow. Your specimen is one of the best we have seen.

T. S.—Your plant is the Round-leaved Sundew (*Drosera rotundifolia*).

J. B. JAMES.—Your description of the unknown bird answers to none so well as the common Starling!

S. T. P.—The kind of daisy (*Bellis perennis*) inclosed is an instance of continued "arrest" of growth. See Masters' "Teratology."

L. S. S.—No. 1 is the Dog-tick (*Ixodes vicinus*), which is found in all sorts of situations, and only attaches itself to the dog when opportunity offers. No. 2 is caused by the epidermis of the leaf being punctured by a species of *Cynips*.

J. A.—Your eggs are—1, Missel-thrush; 2, 3, 4, 5, 6, Blackcap; 7, Stone-chat; 8, Yellow Wagtail; 9, Whitethroat.

W. L. W. EYRE.—The most popular and cheapest book on Diptera and Hymenoptera is Wood's "Insects at Home." Kirby & Spence's "Entomology" might help you, but this is not illustrated. Also "Insect Miscellanies."

R. BAILEY.—There are a good many fungi which behave in the manner described. You had better send us a specimen for identification.

H. T. M.—1 is a dipterous fly, not a moth at all; 2, *Herminia grisealis*; 3, *Hypena rostralis*.

R. S.—The egg was too broken to be accurately identified.

M. O. ROUSE.—The fragment of rock sent is a piece of Liassic limestone, full of the joints and pinnules of a crinoid (*Pentacrinus Briareus*).

P. T.—The Yellow Meadow-vetchling (*Lathyrus pratensis*).

PENNYROYAL.—The scent is an essential oil, contained in the leaves.

R. H.—We do not undertake to return specimens sent to be named. It would involve more time than we could well spare.

R. HAYES.—Your description answers to the Brazilian Parrot (*Psittacus Braziliensis*).

A. KING.—See the article on "Collecting and Preserving Butterflies and Moths," by Dr. Knaggs, in SCIENCE-GOSSIP for June, 1872.

W. B. (Pennycuick).—Your specimens were so smashed it was impossible to make them out. They should be separately mounted, and inclosed in a small tin box, in order to withstand the energy of the Post-office officials.

J. F. DAWSON.—We should esteem it a favour if you would send us a few specimens, well packed.

W. T. HOLMES.—The dark bands of *Cypræa asellus* not unfrequently shade off into orange. Perhaps your specimen is one of these, as we know of no other species. It is a native of the Indian Ocean. We have not met with such a concretion in the Periwinkle as that you describe.

W. L. HALL.—1. You will find a full account of the rules, &c., of the Botanical Exchange Club in the "London Catalogue of British Plants," published by Hardwicke, 192, Piccadilly, price sixpence. 2. If possible, keep two specimens of each sex of every species of butterfly, to show under side and uppermost side.

ALLIARIA.—Your plants are—1, Ground Ivy (*Nepeta glechoma*); 2, Red Nettle (*Lamium purpureum*); 3, Shepherd's Needle (*Scandix pecten*). Get Cooke's "Manual of Botanical Terms," new edition, price 1s. 6d.; and Spencer Thomson's "Walks and Wild Flowers." Hooker's "British Flora" is the best.

H. L. G.—Your fern is *Lastrea dilatata*.

M. A. H.—Your larva *may* be that of *Himera pennaria*, half-grown, but you do not mention its apparent age; *i. e.* whether full-fed or not, the number of its legs, nor its food-plant; and in the absence of these particulars it is almost impossible to decide.—*C. G. B.*

J. B.—You may obtain an Insect Collecting-case at Mr. T. Cooke's, 513, New Oxford-street, London.

E. A. WEIR.—We have no doubt that Mr. S. H. Gaskell, of Edgeley, Stockport, could supply you with Japanese silkworms.

EXCHANGES.

14 Slides of Mosses, &c., from Dr. Lesson's collection, offered for other mounted objects.—J. C. S., 21, Clarendon-road, Holland-park, London, W.

RARE British Butterflies and Moths for Birds' Eggs.—W. P. Hadfield, Newark, Notts.

FOUR dozen of accurately-named Slides of Diatomaceæ (various species), for the volume of "Journal of London Microscopical Society" for 1860, bound or in numbers.—Address, B. Taylor, Hon. Sec. Whitehaven Scientific Association.

WANTED, well-mounted Slides of Animal Hairs, for other good slides.—Send list to E. Lovett, Holly Mount, Croydon.

EGGS of the Landrail, Moor-hen, Chaffinch, Meadow Pipit, Greefinch, Yellow Bunting, and Starling, in exchange for others.—A. E. Shaw, 43, Commercial-street, Leeds.

REMAINS of a large Collection of British Birds' Eggs. Would take for them Butterflies and Moths, or numbers of "Newman's Entomologist." List sent on approval.—W. Thomas, Ray Lodge, Lingfield, East Grinstead, Sussex.

WELL MOUNTED Slides offered for well-mounted examples of the following diatoms:—*Pleurosigma quadratum*, *Meridion circulare*, *Licmophora flabellata*.—W. Nash, Rowcroft, Stroud, Gloucestershire.

MICRO MOTHS.—Rev. L. L. Clark's selection wanted. Say what is required in exchange for them.—T., 10, Davenport, Stockport.

BRITISH PLANTS for interchange.—Send list to J. Harbord Lewis, 180, Mill-street, Liverpool.

GOOD Slides offered for Mole Crickets, Stag Beetles, large green Grasshoppers, large harmless Water beetles, or Giant Cockroach (*Blatta gigas*).—C. L. Jackson, 11, Hesketh-street, Southport.

P. corneus, *D. polymorpha*, *P. Listeri*, *U. pictorum*. *B. montanus*, and others, for good British Marine Shells or Fossils.—E. H. Goddard, Hilmarton, Calne, Wilts.

ARRANGED Scales of *Nothochlæna sinuata* for Polariscope offered for good microscopic objects.—A. C. T., 16, Ennis-road, Finsbury Park, N.

FOR some lively Equisetum Spores send quill and stamped address to J. G. M., 135, St. Owen's-street, Hereford.

FOR *Œcidium Thesii* send stamped envelope to J. Hussey Esq., the Close, Salsbury.

Anthrocera trifolii, for any other specimen of Lepidoptera, either larvæ, pupæ, or imago.—Alfred Wildsmith, Stationer, Batley.

WANTED, specimens of *Sabanus* and *Gasterophilus* preserved in spirit, or mounted or unmounted tongues and other parts of the same. Good mounted or unmounted objects (mostly entomological) offered in exchange.—H. M. J. Underhill, 7, High-street, Oxford.

Planorbis dilatatus, *Zonites glaber*, for any, not common, species of Pupa, Vertigo, or British Marine Shells.—T. Rogers, 27, Oldham-road, Manchester.

FINE live Cocoons of *B. Cecropia*. *Desiderata*:—Larvæ of *Prodromaria*, *Ligniperda*, *Dominula*, British Birds' Eggs, or other Imagos.—John Taylor, Church-street, Tonge, Middleton, Manchester.

EGGS of Ring Ouzel, Twite, Lesser Redpole, Mute Swan, for other Birds' Eggs.—F. Dearnley, Nortonthorpe Mills, near Huddersfield.

Draba aizoides, *Fumaria micrantha* (plants), for Lepidoptera.—N. Richardson, Glanrafow, near Swansea, South Wales.

Carex Boenninghauseniana for Nos. 27, 32, 34, 38, 47, 61, 76, 90, 110, 111, 129, 130, 141*, 143, 144, 177, 181, 200, 240*b*, 241, 277*, 278*, 286, 289, 290, 292, 307, 309, 313, 361, 376, 420, 424, 428, 429, 445, 459, 467, 483, 488, 511, 524, 605, 651, 652*b*, 693, 696, 697, 732, 748, 791, 794, 796, 881, 882, 1032, 1043, 1049, 1050, 1058, 1060*b*, 1061*b*, 1064, 1098, 1106, 1137*, 1142*, 1149, 1251*, 1418, 1419, 1426, 1427, of London Catalogue.—T. B. Blow, Welwyn, Herts.

Spicules of *Gorgonia flabellum* (mounted) for other good mounted objects.—Send list to J. Sargent, Jun., Fritchley, near Derby.

CRASSULACEÆ, Saxifragaceæ, 200 distinct varieties, accurately named, fit for planting a large rock-work, for sale or exchange.—For particulars, address "Cryptogam," Post-office, Cirencester.

DUPLICATES:—Advenaria and Pupæ of *T. W. album*. Wants numerous.—J. Harrison, 7, Victoria Bridge, Barnsley.

PEDICULUS of White Swan, and *Pediculus pubis* of man, for any rare parasite mounted.—*S. W. M.*

A GOSSIP ABOUT BARNACLES.

Of all the strange stories so abounding in the writings of early naturalists—those pioneers of truth, whose strange mixture of fact and fiction shows such a striving after the real, combined with such an evident doubt of, yet lingering after, chimeras, the existence of which we in the present day can hardly conceive,—one of the most curious and apparently best-authenticated is the story of the origin of the *Barnacle Goose*. To most of my readers I have no doubt this myth is more or less familiar, but it is so remarkable, from the amount of direct evidence in its support, and so full of instructive warning to modern observers, that I venture, even at the risk of tiring them with a twice-told tale, to repeat it once more.

I will first give the fable as reported by an eye-witness to what he relates, and I ask the reader to observe that the account was written by no ordinary man, but one accustomed to close observation, and trained to note minute differences—in fact, by our own countryman, Gerard, the father of English botany:—

"What our eyes have seen," says Gerard, in his "Herbal," "and hands have touched, we shall declare. There is a small island in Lancashire, called the Pile of Flounders, wherein are found broken pieces of old and bruised ships, some whereof have been cast thither by shipwreck, and also the trunks and bodies, with the branches, of old and rotten trees, cast up there likewise; whereon is found a certain spume, or froth, that in time breedeth unto certain shells, in shape like those of the mussel, but sharper pointed, and of a whitish colour, wherein is contained a thing in form like a lace of silk finely woven, as it were, together, of a whitish colour; one end whereof is fastened unto the inside of the shell, even as the fish of oysters and mussels are; the other end is made fast unto the belly of a rude mass or lump, which in time cometh to the shape and form of a bird. When it is perfectly formed the shell gapeth wide open, and the first thing that appeareth is the aforesaid lace or string; next come the legs of the bird hanging out, and as it groweth greater it openeth the shell by degrees, till at length it has all come forth, and hangeth only by the bill. In short space after it cometh to full maturity, and falleth into the sea, where it gathereth feathers, and groweth to a fowl bigger than a mallard and lesser than a goose, having black legs, and bill or beak, and feathers black and white, spotted in such manner as our magpie, called in some places pie-annet, which the people of Lancashire call by no other name than tree-goose; which place aforesaid, and of all those places adjoining, do so much abound therewith, that one of the best is bought for threepence. For the truth hereof, if any doubt, may it please them to repair to me, and I shall satisfy them by the testimony of good witnesses."*

This is Gerard's account, published in 1636, and evidently written in all sincerity; but he was by no means the first nor only witness to this remarkable phenomenon. The story is very ancient, and has been repeated by many authors, both British and Continental. Sir Giraldus Cambrensis gives an account of it in his "Topographia Hiberniæ," written in the twelfth century; Michael Drayton refers to it in his "Polyolbion":—

> The Barnacles with them, *which wheresoe'er they breed,—*
> *On trees, or rotten ships,*—yet to my fens for feed
> Continually they come, and chief abode do make,
> And very hardly forced my plenty to forsake.

So does Baptista Porter, who lived in 1500. Count Meyer devotes a volume to it ("Volucer Arborea"); more than one bishop and many distinguished naturalists also give their testimony. I believe about the earliest published statements by an eye-witness is that contained in the "Cosmographe and Descrip-

* Gerard's "Herbal," p. 1587.

tion of Albion," prefixed to the "History and Chronicles of Scotland" of Hector Boëce. In Bellenden's translation the following account of the Barnacle Goose is given:—

"Rests now to speak of the geese engendered of the sea, named Claiks. Some men believe that thir (these) claiks grow on trees by the nebbis (bills), but their opinion is vain; and because the nature and procreation of thir (these) claiks is strange, we have made no little labour and diligence to search the truth and verify thereof. We have sailed through the seas where thir (these) claiks are bred, and find by great experience that the nature of the seas is more relevant cause of their procreation than any other thing. And howbeit thir (these) geese are bred many sundry ways, they are bred ay allanerly (only) by nature of the seas. For all trees that are cassin (cast) into the seas by process of time appear first worm-eaten, and in the small bores and holes thereof grow small worms. First they show their head and feet, and last of all they show their plumes and wings. Finally, when they are coming to the just measure and quantity of geese, they fly in the air as other fowls do, as was notably proven in the year of God one thousand IIII. hundred LXXX, in the sight of many people, beside the Castle of Pitslego: one great tree was brought by alluvion and flux of the sea to land. This wonderful tree was brought to the laird of the ground, quhilk (who) soon after gait (caused) divide it by one saw. Appeared then one multitude of worms, throwing themselves out of sundry holes and bores of this tree. Some of them were rude as they were but new shapen. Some had both head, feet, and wings, but they had no feathers. Some of them were perfect shapen fowls. At last the people having ylk (each) day this tree in more admiration, brought it to the Kirk of St. Andrews, beside the town of Tyre, where it remains yet to our days. And within two years after happened such one like tree to come into the Firth of Tay beside Dundee, worm-eaten and holed, full of young geese in the same manner. Suchlike into the port of Leith, beside Edinburgh, within few years after happened such one like case. One ship named *Christopher* (after she had lain III years at one anchor in one of thir (these) isles was brought to Leith. And because her timber (as appeared) failed, she was broken down. Incontinent (immediately) appeared (as afore) all the inward parts of her worm-eaten and all the holes thereof full of geese, on the same manner as we have shown. Altoure (moreover) if any man would allege by vain argument, that this *Christopher* was made of such trees as grew allanerly (only) in the Isles, and that all the roots and trees that grow in the said Isles are of that nature to be finaly by nature of seas resolved into geese; we prove the contrary thereof by one notable example, shown before our ene (eyes). Master Alexander Galloway, parson of Kinkell, was with us in thir (these) Isles, giving his mind with much earnest business to search the verity of thir (these) obscure and misty doubts. And by adventure lifted up one sea-tangle (*Laminaria saccharina ? Lamouroux*), hanging full of mussel-shells from the root to the branches. Soon after he opened one of thir (these) mussel-shells, but then he was more astonished than afore. For he saw no fish in it, but one perfect shapen fowl small and great ay efferying (proportional) to the quantity of the shell. This clerk, knowing us right desirous of such uncouth (uncommon) things, came hastily with the said tangle, and opened it to us with all circumstance afore rehearsed. By thir (these) and many other reasons and examples we cannot believe that thir (these) claiks are produced by any nature of trees or roots thereof, but allanerly (only) by the nature of the ocean sea, quhilk (which) is the cause and production of many wonderful things. And because the rude and ignorant people saw oftimes the fruits that fell off the trees quhilkis (which) stood near the sea, converted within short time into geese, they believed that thir (these) geese grew upon trees hanging by their nebbis (bills), suchlike as apples and other fruits hang by their stalks; but their opinion is nought to be sustained. For as soon as thir (these) apples or fruits fall off the tree into the sea flood, they grow first worm-eaten, and by short process of time are altered into geese."

Fig. 103. Goose-tree (*Anseres arborei*), from the "Cosmographia Universalis" of Sebastian Munster, printed at Basil, 1572.

In refuting the arboreal origin of the Barnacle Goose, the author falls into an equally absurd error; but he at least shows his desire to arrive at the truth. He also confounds a species of Teredo which had perforated the wood, and was exposed upon the tree being cut, with the Barnacles attached to the exterior, and evidently regards them as the same animal in different stages of development. It is worthy of remark that although the mode by which the young goose escapes from the shell is so graphically described, the beak always forming the last point of attachment, both in Gerard's representation of the tree and all others that I have seen, the young birds are shown with their heads and necks out of the fruit or shell, and not their legs, which should appear first. Turner, the English ornithologist, who wrote in the middle of the sixteenth century, writes as follows:—

"Nobody has ever seen the nest, or egg of the Barnacle; nor is this marvellous, inasmuch as it is without parents, and is spontaneously generated in the following manner. When at a certain time, an old ship, a plank, or a pine mast rots in the sea, something like fungus at first breaks out thereupon, which at length puts on the manifest form of birds. Afterward these are clothed with feathers, and at last become living and flying fowl. Should this appear to any one to be fabulous, we might adduce the testimony not only of the whole people who dwell on the coasts of England, Ireland, and Scotland, but also that of the illustrious historiographer Gyraldus, who has written so eloquently of the history of Ireland, that the Barnacles are produced in no other way. But since it is not very safe to trust to popular reports, and as I was, considering the singularity of the thing, rather sceptical even with respect to the testimony of Gyraldus,—whilst I was thinking over the subject,—I consulted Octavian, an Irish clergyman, whose strict integrity gave me the utmost confidence in him, as to whether he considered Gyraldus worthy to be trusted in what he had written. This clergyman then professed himself ready to take his oath upon the Gospels, that what Gyraldus had recorded of the generation of this bird was most true; for he himself had seen with his eyes, and also handled those half-formed birds; and he said farther, that if I remained a couple of months longer in London, he would have some sent to me." (Turner's "Avium Præcip. Hist.," art. "Ansr.") As though all this were

Fig. 104. "Goose-tree," and "Monstrum est marinum horribile vocaturque *Ziphius*, et deglubit phocam, quam interpretantur Germanicè *Selehund*."—From Sebastian Munster, 1552.

not sufficiently wonderful, it was believed that if the leaves of the Goose-tree fell upon the land they became birds, but if into the water, fishes. (Bauhin's "Pinax," iii. 514.) Even the Royal Society accepted this fable and published in the "Philosophical Transactions" for the year 1677 an account by Sir Robert Murray of what he himself saw in the Western Islands of Scotland. "Being," says Sir Robert, "in the island of Uist, I saw lying upon the shore a cut of a large fir-tree, of about 2½ feet in diameter, and 9 or 10 feet long, which had lain so long out of the water that it was very dry, and most of the shells that had formerly covered it were worn or rubbed off. Only on the parts that lay next the ground there still hung multitudes of little shells. This Barnacle-shell is thin about the edges and about half as thick as broad. Every one of the shells has some cross-seams or sections, which, as I remember, divide it into five parts. These parts are fastened one to another with such a film as mussel-shells have. These shells are hung at the tree by a neck, longer than the shell, of a kind of filmy substance, round an hollow, and curved not unlike the windpipe of a chicken, spreading out broader to where it is fastened to the tree, from which it seems to draw and convey the matter which serves for the growth and vegetation of the shell and little bird within it. In every shell that I opened I found a perfect sea-fowl: the little bill, like that of a goose, the eyes marked, the head, neck, breast, wings, tail, and feet formed; the feathers everywhere perfectly shaped, and blackish coloured; and the feet like those of other water-fowl, to my best remembrance." Sir Robert, however, adds that he did not see any of these little birds alive, nor could he meet with anybody who had, and that the biggest he saw was only the size of his illustration (2¼ in. long); some "credible persons," however informed him they had seen some as big as their fist.

A writer in "Land and Water" (March 27, 1869) quotes a passage from Cervantes' "Persiles and Sigismunda," which shows that the story was known to that author two centuries and a half ago. He makes the people on the Irish coast cultivate the Barnacle by thrusting poles into the sea-beach among the rocks reached by the tide. "In a short time that part of the poles covered with water is converted into hard stone, and the portion standing out of the water becomes rotten and corrupted, out of which corruption is engendered a small bird, and so savoury to the palates that it is one of the greatest delicacies to be enjoyed." Mr. J. K. Lord also in "Land and Water" (19th Feb., 1870) quotes the following lines from Du Bartas, an old French poet who lived about 1550:—

> So slow Bootes underneath him sees,
> In th' icy Islands, *goslings* hatch'd of trees,
> Whose fruitful leaves, falling into the water,
> Are turn'd, 'tis known, to living fowls soon after.
> So rotten planks of broken ships do change
> To barnacles. Oh transformation strange!
> 'Twas first a green tree; then a broken hull;
> Lastly a mushroom; now a flying gull.

Who can wonder, after all these circumstantial and minute statements by the most celebrated naturalists of the times in which they lived, that the belief in the "anomalous generation" of these birds should be general? It seems impossible that such men should be so absolutely mistaken! A writer in the "English Cyclopædia," speaking of Gerard's evidence, thus concludes:—"After this can we wonder at the melancholy catalogue of human beings who have expiated the supposed crime of witchcraft at the stake on the testimony of their deluded and deluding prosecutors? Here is a man of learning and considerable accuracy in many points, the author of a valuable work containing much information, who gravely and deliberately, on the authority of two of the most acute of his senses, asserts a downright falsehood and courts investigation. He may, moreover, be acquitted of any intention to deceive; but his mind was filled with previous assertions and preconceived opinions, and his excited imagination, like that of the majority of the witnesses against the unfortunate witches, gave a colour and form to all he saw and felt." There can be little doubt many of these poor wretches suffered death on exactly similar evidence to that we have just been considering, equally mistaken, but given with equal good faith.

There were exceptions, however, to the general belief in this story of the origin of the Barnacle Goose. Albertus Magnus, who died in 1280, distinctly denies the fable, and asserts that not only himself, but many of his friends along with him, "had seen them pair, lay eggs, and nurse their young." ("Hist. Anim.," xxiii., edit. Venetiis, 1495.) Belon also, 1555 ("Oiseaux," p. 158, Paris ed.), treats the absurd notion with contempt, and bears testimony to having seen them lay and hatch their eggs. Æneas Sylvius Piccolomini, afterwards Pope Pius II., was not disposed to believe in miracles of this sort, and searched for evidence when in Scotland; but, like the *ignis fatuus*, the goose-tree receded as he approached, and finally took up its abode in the Orkney Islands, where he does not appear to have followed it. Gerard de Verds (about 1599) also found large numbers of birds breeding on the west coast of Greenland, which he recognized as the "Rot-geese" which visited his native Holland every year. Lastly, in Ray's edition of Willoughby, published in 1678, the following passage occurs:—"What is reported concerning the rise and origin of these birds,—to wit, that they are bred of rotten wood; for instance, of the masts, ribs, and planks of broken ships, half putrefied and corrupted, or of certain palms of trees [the catkins of the willow] falling into the sea; or, lastly, of a kind of sea-shell, the figures whereof Lobel, Gerard, and others have set

forth,—may be seen in Aldrovand, Sennertus in his 'Hypomnemata,' Michael Meycrus, who hath written an entire book concerning the tree-fowl, and many others. But that all these stories are false and fabulous, I am confidently persuaded. Neither do these want sufficient arguments to induce the lovers of truth to be of our opinion, and to convince the gainsayers. For in the whole genus of birds (excepting the phœnix, whose reputed original is without doubt fabulous) there is not any one example of equivocal or spontaneous generation. Among other animals indeed, the lesser and more imperfect,—as for example many insects and frogs,—are commonly thought either to be of spontaneous original or to come of different seeds and principles. But the greater animals and perfect in their kinds, such as is among birds the goose, no philosophers would ever admit to be in this manner produced."

An old writer, Salmon, in his "English Physician," published in 1693, reviews the evidence on both sides, and ingeniously reconciles both theories. He cannot doubt that they are at first spontaneously bred, and at the same time does not deny that they increase and multiply in the usual manner afterwards.

How all these wonderful stories arose it is difficult to imagine; their origin is lost in the mists of antiquity, and it is in vain to speculate. Certain it is that but for the serious manner in which they are related, and the known veracity of the authors in whose works they occur, we should be inclined to accept these stories as mere flights of the imagination; and to accuse Sir R. Murray of "poking fun at us" when he tells of the perfectly-shaped and coloured little geese he found in the shells attached to the tree-stump which had been so long out of the water that it had become "very dry," and the shells not already worn or rubbed off were doubtless in a very advanced state of decomposition.

T. S.

A FEW NOTES ON THE APHIDES.

NEVER within my memory have I observed the Aphides (commonly called Plant-lice) so abundant as this spring; in fact, every tree, plant, and flower is covered with them. How hated they are by those who are fond of floriculture, and even by the most listless, who in plucking a flower, find the nasty effect of their sticky juices! There is not a plant but can boast of their company, and can show more or less the evils of it. The aphis most generally remarked is the one that feeds on roses. It is a bright-green colour, has an oval body, and a small head, which is furnished with a pair of bright scarlet eyes. Its antennæ are long and fine, and reach almost to the two tube-like appendages on the extremity of its back. It has six legs, which are long and thin, each of which is terminated with two short hooks, with which it can cling in a marvellous manner to whatever plant it happens to get on. When looking at the aphis on a plant, one would think, from its tranquillity, that it was doing no harm; but then, on examining it with a magnifying glass, it will be seen that it has a long proboscis, with which it has pierced the tender shoot, and is feasting on the sap which ought otherwise to nourish the plant. When looking at a large aphis the other day, which was settled on a currant-leaf, I was much surprised to see the insect very uneasy, but soon the cause was made apparent by the fact of its having given birth to a little one, which clung to its mother in an affectionate manner, and regaled itself on the juice that came from the syrup-tubes of its parent. I disengaged it with some difficulty, as I wished to see if it could crawl. This it did, and went and joined the smaller ones of its species on the same leaf. Various are the colours of the aphides that infest lime-trees, elms, elder, apple-trees, hop plants, &c.; but any reader of SCIENCE-GOSSIP can examine these easily. It has often been argued whether the aphides ever lay eggs: this they most undoubtedly do, and the time is probably in autumn. From these will spring the insects which are to be the ancestors of succeeding generations in spring and summer. When looking at a dahlia that had many of these insects on it, I observed numbers of black ants running up and down the stem of the plant. Having heard of their being able to "milk" the aphides, I watched for the performance. This I saw very cunningly performed. The ant very cautiously approached the aphis, which had the antennæ laid flat on its back (for those that had theirs up always crawled away), began with its antennæ to tickle the hinder part of the aphis, first slowly, and then quickly. This had the effect of pleasing the insect so much that it squirted out a few drops of the much-coveted liquid; this the ant seized on, and having devoured it, proceeded to do likewise to some others, with the same success, and thus satiated its appetite. It might be thought that, as the aphides are such small insects, they cannot do much harm; but their immense numbers, and the quickness with which they increase, will furnish, I think, clear evidence against them. If they were not kept within bounds, and prevented from over-multiplying by birds, insects, and their other enemies, all vegetation would suffer to a fearful extent. They must be possessed of some powerfully acrid fluid in their proboscis, as on many plants that they attack the leaves are found to be crumpled up and contorted in a curious manner. On examining the back of the leaf, a colony of aphides will sure to be found. This subject is so interesting that any one beginning to investigate into it is led on to make further inquiries about an insect which, although well known by general ap-

pearance, still is unknown as to its development and peculiarities. Many modes of exterminating it from plants have been suggested, and some, no doubt, have succeeded; still, I think I can prescribe a simple and effectual remedy, and one that, as far as I can observe, will do no injury to the plant. My mode of action is as follows:—Purchase at any druggist's a square of carbolic soap, make a strong lixivium of it with rain-water; this should then be put into a bowl or other suitable vessel; into this submerge the buds or leaves of the plants infested with the aphides. After a few applications of the above the plant will be found to be freed of its destroyers, and will probably never again have any others on it.

RALPH H. WESTROPP, A.B., T.C.D.

THE NATURAL HISTORY OF LEICESTERSHIRE.

THE following paper was recently read at the Conversazione of the Diocesan Conference in the Leicester Museum, by F. T. Mott, F.R.G.S.:—

Let us consider the Natural History of our county in its relation to that of Great Britain, and also in its relations to the Natural History of the world. No complete account of the animal and vegetable life of Leicestershire appears ever to have been published. Portions of the subject have been treated in various works, and an attempt was made to produce a complete county Fauna and Flora. The manuscripts of the complete Flora, and of several sections of the Fauna, all worked out by such competent naturalists as the late Rev. W. H. Coleman, Mr. James Plant, and others, still lie, I believe, in the cabinets of their authors.

I have found it impossible to obtain exact statistics of the whole Fauna and Flora of the county; the following estimates, in round numbers, will, however, give a general idea of the position occupied by this small section of the earth's surface.

The number of species, animal and vegetable together, known to exist upon the earth at the present time, cannot be less than 340,000; of these there may be about 26,000 found in the British islands; and perhaps in this county as many as 6,000, that is to say, that Leicestershire contains about one-fourth only of the species which are found in all parts of Britain together, and only about one-sixtieth of those which are known to exist in the world. It is quite likely that the known species are not more than one-half of those which really exist, because the greater part of the earth's surface has been very imperfectly searched, and the invertebrate animals and cryptogamous plants, which enormously outnumber the vertebrates and phanerogams, are mostly small and inconspicuous, thousands of species being entirely microscopic. Even among insects,—often brilliant and striking objects, what still remains to be discovered may be partly imagined by the fact, that Mr. Henry Walter Bates, the Leicester traveller, of whom the county should be proud, sent home from the forests of Upper Brazil 8,000 species of insects entirely new to science. The real proportion between the British species and those of the whole world is rendered quite uncertain by the knowledge that so much is yet unknown, and still further, by the fact that no country in the world has been so *thoroughly* searched as this little kingdom. The probability is, therefore, that we greatly overestimate the relative importance of our local Fauna and Flora, and that instead of representing one-sixtieth of the total existing species, one-hundredth, or even one-hundred-and-fiftieth may be nearer to the truth.

Leaving out the vast domain of invertebrate animals, in the lower divisions of which we can do little more than guess at approximate numbers, and confining ourselves to the vertebrates and the plants, our statistics become more trustworthy.

The distinct species of vertebrate animals existing in the world probably do not much exceed 25,000. Of these about 700 are recorded as British, and about 210 of them may be found in Leicestershire. Here we have our county Fauna representing one-hundred-and-twentieth of the world's total; but as it is a well-recognized law of nature that the more complex forms of life are more local, less widely and generally distributed than the simpler forms, we might expect that in any one locality the proportion of vertebrates should be smaller than the proportion of invertebrates, while yet the effect of this law may quite possibly be counteracted by the vastly greater number of the invertebrate species.

Of our 210 local vertebrates we find about 25 mammals, 150 birds, 10 reptiles, and 25 fishes; and it is a fact to be noted, that while our mammals and our birds each represent about one-fiftieth of the world's total, our reptiles are only one-two-hundredth, and our fishes one-three-hundred-and-sixtieth. The causes which affect the local distribution of species are numerous, and some of them obscure, but it is evident that the physical geography, the geology, the climate, the number of human inhabitants, and the degree in which the land is cultivated, are among the most prominent of these causes. Dr. Pulteney, in the introduction to his list of Leicestershire plants, published in Nichols's History, and compiled about a century ago, speaks of this county as comparatively rich in species, owing to its varied soils and the existence within its borders of Charnwood Forest. What indeed would Leicestershire be without its forest? Our old Charnwood is to the naturalist the central jewel of the county. Without its influence our small vertebrate Fauna would be reduced by at least twenty species, our

flowering plants by a hundred species, and our cryptogams probably by at least 300. Already we have lost several vertebrates, and a score or so of flowering plants, by the cultivation of the hill-sides and the draining of the bogs. But the craggy summits refuse to surrender to the plough. The brook-sides are still rich in mosses and hepaticæ, and the plantations, now half a century old, are fruitful generators and protectors of life. To the forest, also, we probably owe the fact that out of the fourteen reptiles known in Britain, nine or ten may be counted as Leicestershire species. Into the question, how it happens that only fourteen species of reptiles inhabit these islands out of the existing 2,000 we need not enter minutely. Our insular position and our mean temperature are probably the chief causes. Reptiles are a cold-blooded class, and, having no warmth in their hearts, they like to feel it on their skins. To bask in hot mud with a tropical sun upon his back is the elysium of a crocodile. Reptiles are most numerous within the tropics, and these happy islands lie 2,000 miles away from that nursery of all noxious vermin. But there is one thing which Leicestershire lacks. It is almost a waterless county. We have brooks and we have ponds; here and there we have an artificial reservoir; but we cannot call the Soar a river, nor Groly Pool a lake, and the music of the sea is never wafted to our midland ears. Many consequences result from this position, and one of them is that only about 25 species of fish are native to the county, while Britain numbers at least 250, and the world's total is nearly 10,000.

In vegetable life Leicestershire probably contains about one-fortieth of the known species, that is 3,000 out of a total of 120,000; but in that total of 120,000 only the odd 20,000 are cryptogams, while in our 3,000 two-thirds are cryptogams. This no doubt implies that the world has not been searched for cryptogams to anything like the extent that Britain has been. If there really exist as large a proportion of these lower forms to the higher as in our county, the total will be 300,000 instead of 120,000, and our proportion will be one-hundredth instead of one-fortieth.

In relation to other counties, Leicestershire maintains an average place in the extent of its Flora. There are scarcely any data for making a comparison of county cryptogamic Floras, but of flowering plants I believe no county produces fewer than 700 species, nor more than 1,100, out of the 1,500 British species. The Flora of Leicestershire numbers about 900, which is exactly midway between these limits. There are no plants which are found *exclusively* in our county, as there are none which are found exclusively in Britain. But we have some plants about Charnwood Forest which are singularly isolated, and which the botanist, when he leaves that very ancient mountain summit, must travel many miles to find again; such plants as the *Cotyledon umbilicus*, plentiful at the Swithland slate-pits and among the slates of Wales, found also in many other counties, but not in the midland plain, nor probably anywhere within thirty miles of Charnwood. Such also as *Campanula patula*, the ornament of one only of our forest lanes, and of which the next nearest station is, I believe, the Malvern Hills.

Fifty years ago we had a few relics of an alpine, or sub-alpine, Flora on the Charnwood Hills. These have nearly all disappeared with the progress of cultivation; but there is still a marked speciality about the forest plants, which will inevitably lead the thoughtful naturalist to ask, what *is* this little rugged region, only ten miles by six? what is its geological history, that it should be the refuge of a vegetable life not known in all the country round?

Look at it on a physical atlas, study the nature and relations of its rocks, and the answer is plain. It is a remnant of one of the very earliest mountain-chains of which any traces yet remain—a chain extending from the North Cape, through Norway, Scotland, Westmoreland, Wales, Cornwall, Brittany, and perhaps much further south. The elevation of this mountain axis dates back before the Carboniferous era. It has been raised and lowered bodily time after time, and the valleys between its peaks have been gradually filled up with the vast beds of secondary and tertiary rocks. But the peaks themselves are still uncovered here and there, and one of these ancient peaks is Charnwood Forest.

ON THE ECONOMY OF THE FRESH-WATER POLYP.

I HAVE previously made a few observations on the above subject, communicated to this journal in two papers: the first, published in the vol. for 1872, page 132, was chiefly confined to a description of the sperm-cells which I had seen forming on the hydra, and the ultimate discharge of the spermatozoa into the water; my second communication was published in the January number of the present year (page 12), and also treated on the same subject, but with an additional account of the formation of the ovisacs on the same hydra, and of their separation from the Polyp in the shape of small globes, which sank to the bottom of the water. I had hoped to witness the hatching-out of the young, but from various causes at that time I was not successful; still I then expressed a hope that I should meet with better success in future attempts, and of proving in what form they leave the egg. I had expressed an opinion that they first appear as minute grubs, without any tentacula. This I am now, in my present and third paper, able to clear

up, from observations made this spring, an account of which I think may interest some of the many readers of SCIENCE-GOSSIP.

Having obtained from a pond a number of *Hydra viridis*, and wishing, if possible, to witness the production of this hydra from the ova (which Professor Rymer Jones remarks, in his "Animal Kingdom," has never yet been witnessed), I placed several of them in separate shallow cells, in order to watch the process. This was about the 20th of April, 1873. All of those thus placed in cells had more or less forming upon them at the time the sperm-cells and ovisacs, and not a day passed without every one of them being placed under the microscope for examination.

Fig. 105. Ova of *H. viridis*, after being hatched out.

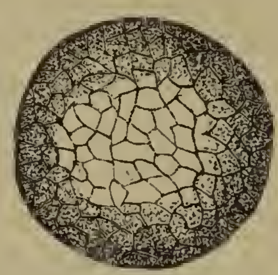

Fig. 106. Ditto before being hatched out.

If any change had taken place, it was duly noted. I had above thirty eggs altogether distributed in various cells. Some of the ova burst prematurely (as shown in fig. 16, page 13, January number), dispersing their contents in various-sized granules, and finally disappearing. Others gradually shrank up and wasted away; some of them were destroyed by minute paramecia, that appeared to feed on them. Thus things went on over three weeks, and I began to despair of witnessing the hatching-out I so much desired. Still I hoped on, determined not to be beaten if possible. I continued to watch very narrowly from day to day the eggs still left, and on May 22, in one of the eggs from a hydra I had placed in a cell on April 22, I thought I saw a movement in a part of the egg that had become partially clear—as they are otherwise all opaque, and their surface, when seen under the microscope, appears to be covered by an irregular network, which is more plainly seen after the hydra has left it (as shown at fig. 105). To make sure, I watched it every hour, and I was not deceived: the minute creature was there, and endeavouring to liberate itself from the egg; and, as is characteristic of the hydra, it continued to contract and extend its body, until at length the egg, which was perfectly round (as at fig. 106) until now, had, by these exertions, become somewhat elongated, and at the same time thin, so that the object within could be distinctly seen. At times it drew itself up into a complete ball, then again extended itself to its utmost length, thus pressing the egg out until it finally gave way. Just before this took place, while in the egg, two very small tentacles were visible. They were very small indeed, but still, by their being present, I was enabled to distinguish which was the head. After the rupture of the egg, which took place thirty-two days after it was laid, I saw the hydra clear itself entirely from it. This took about thirty minutes to accomplish, from the time of the first perceptible crack or break in the egg; the young hydra still continuing the contracting and elongating process of its body as before observed while in the egg, and three hours after leaving the egg it presented alternately the forms as in figs. 107 and 108. About the fifth day

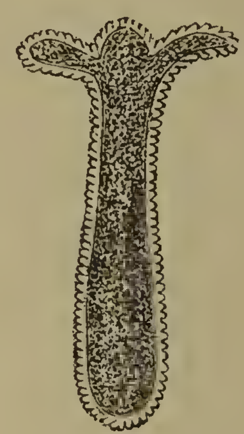

Fig. 107. *H. viridis*, three hours after leaving the egg (elongated).

Fig. 108. Ditto (contracted).

from the time of hatching, the third tentacle began to show, and on the seventh day the three tentacles were seen, as at fig. 109. It was now observed for the first time to use the suctorial disc on the footstalk, which had been gradually forming, by which it could fix itself to any object. The first few days it appeared to be quite free in the water, still having the power of lengthening and contracting the body; but when attached by the sucker at the foot, it extended the body to nearly double the length, and the tentacles increased in length. What it has fed on since its escape from the egg I cannot say. I could not perceive that it took any food, still it continued to grow slowly. At first it was slightly tinted with green, which gradually became darker, and the colour extended to the tentacles, which at first were quite colourless. The eggs vary a little in size, but their mean diameter is about $\frac{1}{60}$th of an inch. Although I have had a large number of hydras during the last three years under observation, I never but once saw two ova produced from one hydra. This, I think, is a rare occurrence, so I now give a sketch of it in fig. 110.

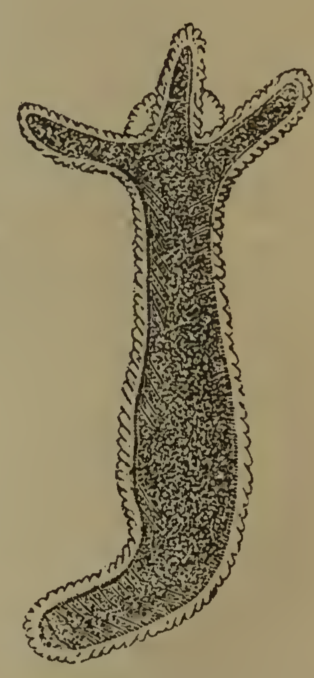

Fig. 109. Young Hydra, seven days after leaving the egg.

It has been generally thought and expressed that the *Hydra vulgaris* deposits its ova in the autumn, and that they are hatched out in the following

spring, and as far as my observation of them has gone hitherto, I have found this to be the case; but now I have to record an exception to this rule. In a glass containing about six quarts of water, in the summer of 1872, I had a large number of hydras (which I believe were produced from ova deposited there the year before), and towards the end of the summer, 1872, they all disappeared, and the *Anacharis alsinastrum*, duckweed, &c., became literally

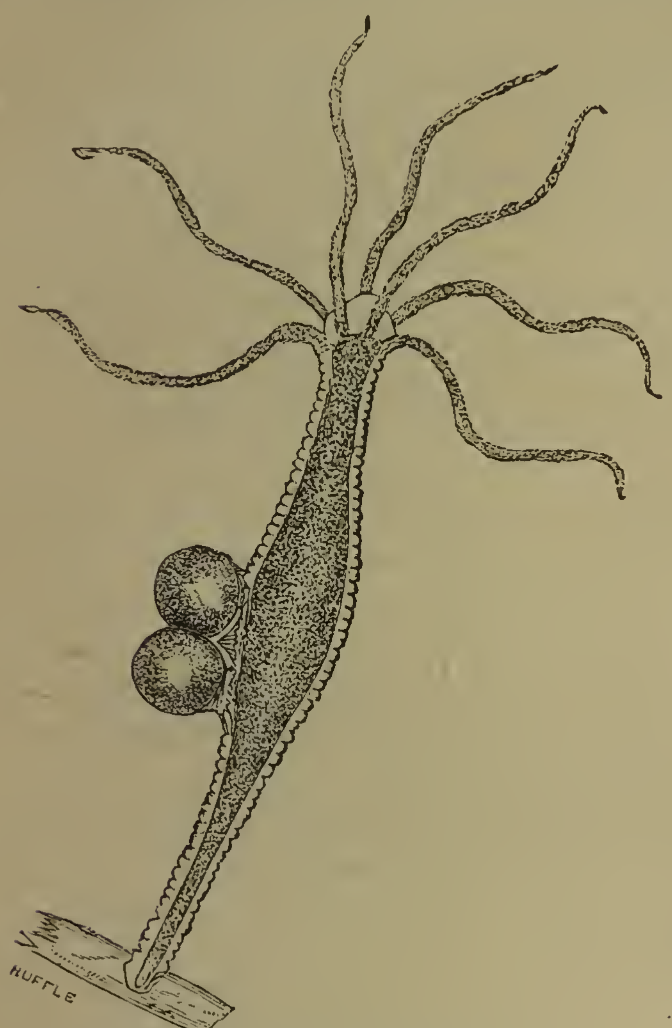

Fig. 110. *H. viridis*, producing two ova.

covered with *Stentor polymorphus*, also a quantity of *Melicerta ringens*, *Stephanoceros*, and *Floscularia*, which died out in their turn, but while living afforded great pleasure as objects for the microscope. Then, as early as the beginning of March, 1873, I observed a number of hydras again making their appearance in the same water, and very soon, to my surprise, many of them were producing sperm-cells and ovi-sacs, and numbers of the ova from these became attached to the sides of the glass, from which many of them must have been hatched-out, as, early in May, they were to be seen from the smallest size and all the intermediate sizes to the full-grown hydra. This unusual development may be caused by their being kept continually within doors, where the air has been kept at a more equal temperature.

Canterbury. JAMES FULLAGAR.

MOLE.—Goldsmith, in his "Animated Nature," says the mole is not found in Ireland. Will some Irish correspondent kindly inform me whether such is the case?—*W. H. Warner, Kingston.*

ANCIENT TREES IN IRELAND.

THE attention of the readers of SCIENCE-GOSSIP has been called to the old trees in England; it may therefore interest them to get a short description of some very ancient trees in the sister isle.

South-west of Lough Corrib, the second largest sheet of fresh water in Ireland, lies a rocky plain, formerly the ancient territories of Gnomore and Gnobeg. This country for the most part is a slightly undulating crag of carboniferous limestone, while here and there patches of boulder drift, or ridges and mould of gravel, belonging to the newer or second "Esker period," occur on it, and in the low places accumulations of peat. In ages long past it would appear that the land was higher than at present, and covered for the most part with a scrub of oak, hazel, mountain ash, holly, and the like, with, on the drifts, larger trees, some of the latter even occurring here and there in favourable places all through the district. In subsequent years, as the land sank, peat began to grow in the low places, till eventually large tracts of bog occupied a considerable portion of the plain, while in much later years the wood that remained was cut down for smelting iron-ore and other purposes. Tradition says that the last iron-furnace in the district was put out about 200 years ago, when they had consumed all the wood; and this is probably correct, as the last furnaces in Ireland—those of Woodford, on Lough Derg, and Portroyal, on Lough Mask, have been extinguished 150 years.

When cutting the bogs, the remains of the trees that formed the forest are found; the roots and blocks that occur being principally oak and yew, as these trees and deal last longer in peat than any others: deal sticks, however, are few here; we may therefore suppose they were scarce in this ancient forest, or more probably it existed prior to the "Deal-Forest age," as it is well known that in Ireland, prior to the formation of the bogs, the country for the most part was covered with an oak forest, while the Deal-Forest age did not commence till long after the peat began to accumulate. We are not, however, at present interested in the age of these different forest periods, and must return to our old trees.

The roots and trunks of the yew and oak occur under the peat, following the undulations of the ground; and as the surfaces of the bogs are nearly level, in some places they are found with many feet of peat over them, and in other places there are only a few inches, while in one place, on the wildest part of the bare crag, are the remains of some yews that seem to be of a similar age to those that in the low places are now covered with peat. These occur in the townlands of Corranneile-drum and Kylemore (*Anglicè* great wood), the remains of

twelve being counted. The first is 9·5 feet in circumference at the base, and 10·5 feet high: from a distance it looks like one of the old Irish crosses.

The second is 7 feet in circumference at the base, and 9·5 feet high: this lies to the north-west of the last, and is built into the wall that forms the parish boundary between Killannin and Kilcummin: it is decayed in the centre and not near as perfect as No. 1. The third is a stump 4 feet high and 3 feet in diameter: this is said to have been the finest tree in the group, but a short time before my visit a barbarian cut off the upper portion. The other nine consist of roots or stumps, none of the latter being more than three feet high, while most of them are about one or two feet. These trees seem to have existed for ages without any foliage, and if they are of contemporary age with those in the neighbouring bogs, of which there seems to be every probability, they must be thousands of years old, and some of the oldest, if not the oldest, trees in the United Kingdom.

Another old tree that may be recorded is the "old yew of Lusmagh," in the King's County, on the side of the Esker, that extends from Birr to the Shannon, at Meelick. This tree has also for centuries been without foliage, and may be of nearly a similar age to those on the crags south-west of Lough Corrib. G. H. K.

ON CAVE-DWELLERS.

NOW that an interest is felt by almost everyone in the inquiries into the state of the prehistoric inhabitants of Europe, both human and animal, I have thought that it might interest some of the readers of this Magazine to read a few notes of a personal experience of some very interesting caves which I have visited, and which we find to have been inhabited at a remote period by men, and by animals at much earlier times still, both having left many distinct traces of their sojourn.

A few years since, when I was in the south of France, I took the opportunity of visiting a series of caves on the Italian frontier not far from Mentone, which had then been little explored. I found a great many remains, of which I propose to give a short description, and, last year, the caves were partially properly explored by a Frenchman, by direction of the French Government, and this has led to a result which has made these caves very famous, and to which I shall allude further on.

The caves are situated in the face of a red limestone cliff, at one of the most picturesque spots on this part of the Mediterranean shore. They are mostly high, not very deep, clefts in the rock, of a triangular shape at the mouth, that is, wide below at the ground and ending in a point above.

On entering the caves, the first thing to be found was a dusty black alluvial deposit, some feet deep, mixed lightly with the later remains, that is, the more recent class of bones, flints, shells, &c.

Deeper down, and more in front of the caves, is a bed of breccia, many feet, perhaps yards, deep, formed of the decayed rock fallen from above in angular fragments and mixed with great quantities of bones, and bound by the lime filtered in by water into a regular concrete.

In front of part of this cliff is a bit of the old Roman road, called properly, I believe, the Via Aurelia, with a picturesque little bridge over a chasm, also of Roman date. At the top of the cliff, above, is the splendid cornice-road made by the great Napoleon. Near this was found, some time ago, a large quantity of flints, broken and chipped, which turned out to be, not relics of the Stone age, but of the time when Napoleon's soldiers, passing that way, new flinted their muskets.

It is probable in very early times, when the floor of the caves was much lower than at present, and the caves deeper, on account of the face of the cliff not being so worn away, that animals must have inhabited them for a very long period, as the quantity of bones is immense.

Now, as to the animals represented here, I have in my possession some teeth and pieces of jaw of a kind of hyena, larger than any living species, which were probably at one period the masters of the caves, and took back large numbers of other animals as food, and left great layers of teeth and broken bones in the caves.

I have also several bones of the great elk (Megaceros), which was six feet in height from the ground to the top of his back.

Perhaps the most plentiful bones are those of the smaller deer kind—the red deer among others, which seems to have abounded. There are a great many molar teeth of the horse (as far as I know, the only way in which it is represented), the ox, and pig; also of the goat, rabbit, marmot, and some other rodents, which are hard to identify with certainty. I have also a fine 'tusk,' or canine tooth, of a bear.

Besides these, I have one tooth of an animal which it is certainly rather hard, without ocular proof, to imagine living in this locality,—this is the rhinoceros.

The reader will thus see that there was a considerable variety of animals, all, however, excepting the elk, hyena, and rhinoceros, now living in Europe, either wild or domesticated.

Inside the caves quite another era is represented. Naturally, no flint is found for a couple of miles; but here there are numbers of fragments, many of them without doubt worked by man. I have some, both rough and worked. I have also a lump of charred wood, which I dug out myself. There are here, of course, the remains of the animals used as

ood by the inhabitants,—the ox, deer, &c., and many birds. They seem to have made no kind of 'midden' or refuse-heap, but just to have thrown down the bones and let them accumulate on the floor. However, if they cooked their food, that was some advance in civilization. But the most interesting discovery of all (in some respects) has been made since I was there.

It is comparatively very rare to find any human bones in these cave deposits, partly, perhaps, on account of the people having been usually buried in the ground, and left to decay, instead of being preserved as the animal remains were, under shelter, and in such a preservative substance as limestone.

However, last year in one of these caves there was found, buried under the débris of rock, an entire human skeleton, lying on its side, with the feet crossed, and the hands up to the face. The head rested on a stone. It is thought by some to be the skeleton of a rather tall woman. The thigh-bone measures 47 centimetres (about $18\frac{1}{8}$ inches), perhaps slightly longer than the average.

Curiously, the skull is of a dark red colour, different from the rest of the body, which fact is, as far as I know, quite unaccounted for. The teeth are well preserved. Round about the body were found a number of shells, each pierced with a small hole. They may have formed some ornament.

When I said *buried* under the débris, I do not mean regularly interred; every circumstance points to the fact that the person died here, probably in sleep, and either was covered over where he or she lay by human agency, or that the process of nature in disintegrating the rock, and the general deposition of soil, has done so in course of time.

I have some photographs of the skeleton *in situ*; but, though the bones are untouched, the French have, with characteristic ingenuity, arranged a sort of magic circle of flint implements round it.

Being so complete, and having been carefully noted before being disturbed, it forms a very valuable addition to ancient cave-lore.

Curiously enough, this cave-dweller became literally a bone of contention between the two nations, having been found in Italian soil, but by a Frenchman, M. Rivière, authorized by the French Government. However, the French managed to get it, and it is now safely lodged in the Natural History Museum in Paris.

I have now briefly stated the facts about these caves. As regards abstract speculations as to the age of this skeleton, for instance, it is beyond my power to offer a suggestion, and, with the present state of knowledge, I should say the theories of any geologist would be but vague guesses. There may have been, moreover, a considerable space of time between the last animal and the first human inhabitant.

Of course the interest of the subject really lies in these questions; but they cannot yet be answered. I hope, however, the time is not misspent in learning something of the data of such interesting problems. H. A. FREEMAN, A.R.I.B.A.

A DENTIGEROUS BIRD.

(*Odontopteryx toliapicus*, Owen.)

PROFESSOR OWEN, at a recent meeting of the Geological Society of London, gave an account of the skull of a dentigerous bird from the London Clay of Sheppey. The specimen consisted of the brain-case, with the basal portion of both jaws. The author described in detail the structure and relations of the various bones composing this skull, which is rendered especially remarkable by the denticulation of the alveolar margins of the jaws, to which its generic appellation refers. The denticulations, which are intrinsic parts of the bone bearing them, are of two sizes,—the smaller ones about half a line in length, the larger ones from two to three lines. The latter are separated by intervals of about half an inch, each of which is occupied by several of the smaller denticles. All the denticles are of a triangular or compressed conical form, the larger ones resembling laniaries. Sections of the denticles show under the microscope the unmistakable characters of bird bone. The length of the skull behind the fronto-nasal suture is 2 inches 5 lines; and from the proportions of the fragment of the upper mandible preserved, the author concluded that the total length of the perfect skull could not be less than between 5 and 6 inches. The author proceeded to compare the fossil, which he declared to present strictly avian characters, with those of birds in which the beak is longer than the true cranium, a character which occurs as a rule in aquatic birds. He stated that none of the Waders have the nostrils so remote from the orbits as in *Odontopteryx*; and this character, with the absence of the superorbital gland-pit, limits the comparison to the Totipalmates and Lamellirostrals. The former are excluded by their not having the orbit bounded by a hind wall as in *Odontopteryx*; and in this and other peculiarities the fossil seems to approach most nearly to the Anatidæ, in the near allies of which, the Goosanders and Mergancers, the beak is furnished with strong pointed denticulations. In these, however, the tooth-like processes belong to the horny bill only, and the author stated that the production of the alveolar margin into bony teeth is peculiar, so far as he knows, to *Odontopteryx*. He concluded, from the consideration of all its characters, "that *Odontopteryx* was a warm-blooded, feathered biped, with wings; and further, that it was web-footed and a fish-eater, and that in the catching of its slippery prey it was assisted by this pterosauroid

armature of its jaws." In conclusion, the author indicated the characters separating *Odontopteryx* from the cretaceous fossil skull lately described by Prof. O. C. Marsh, and which he affirms to have small similar teeth implanted in distinct sockets.

PROBOSCIS OF MOTHS AND BUTTERFLIES.

CAN SCIENCE-GOSSIP give me any information about the structure and use of the small projecting bodies that clothe the extremity of the

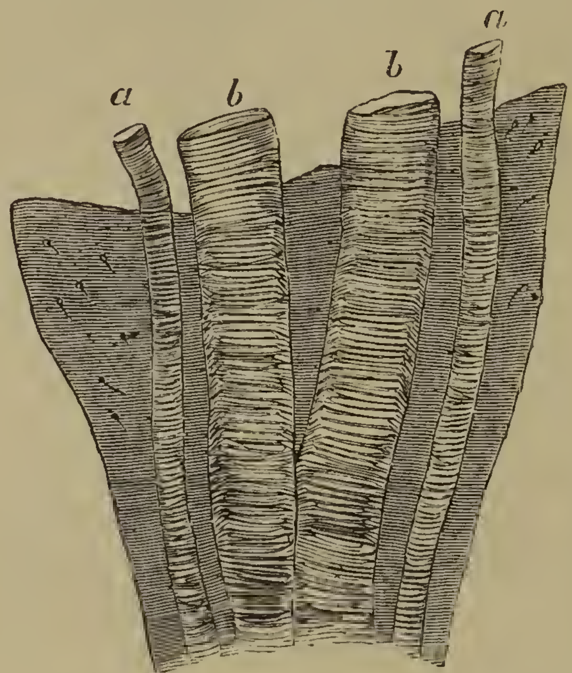

Fig. 111. Commencement of Proboscis of a Moth; *a*, small tracheæ; *b*, large ditto.

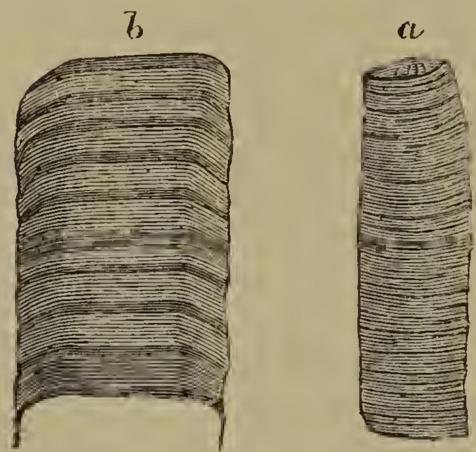

Fig. 112. The Tracheæ more highly magnified.

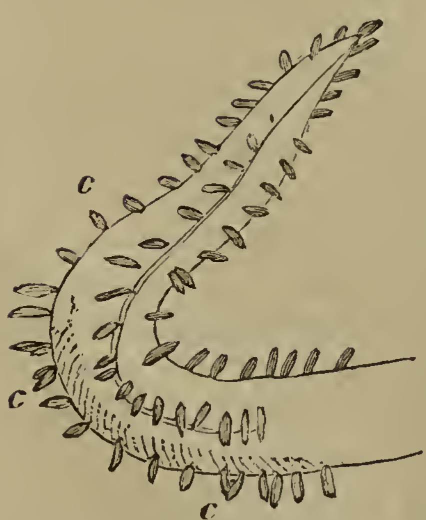

Fig. 113. Extremity of the Proboscis.

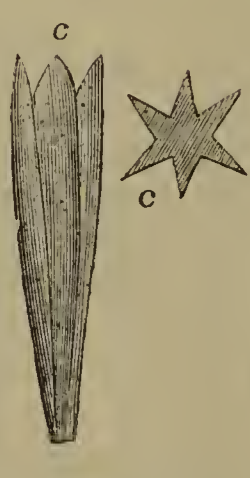

Fig. 114. Six-sided organ, side and top view.

proboscis of certain moths and butterflies? Dr. Carpenter speaks of them as barrel-shaped. In the example I have endeavoured to figure they are more like the narrow scales of the gnat. But they appear to me to be six-sided bodies: the top, when looked down upon from above, has the appearance

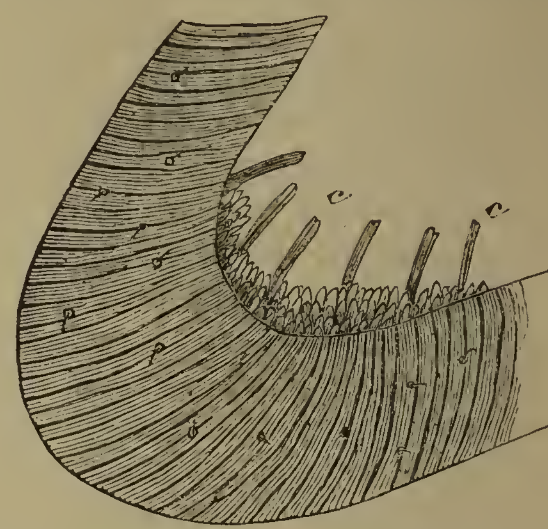

Fig. 115. Papillæ at the base of the six-sided organ.

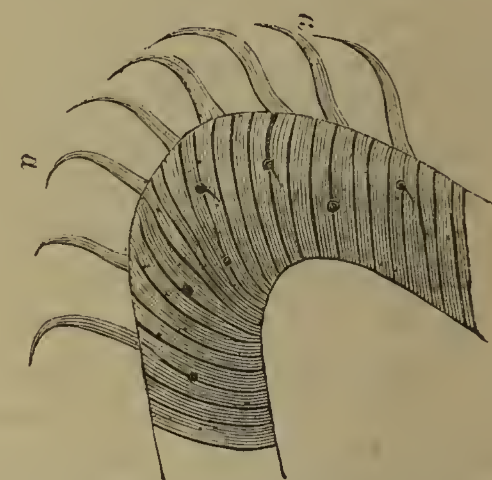

Fig. 116. Hooks (*a*) at the edge of the Proboscis.

of a six-rayed star. I should like also to know whether the tracheæ or air-tubes have been traced throughout the length of the proboscis. One of my preparations happens to show their commencement at the widest part of the proboscis very clearly, but I cannot follow them farther. Perhaps some of your correspondents can tell us something more about these curious organs, and their general economy. R. H. NISBETT-BROWNE.

SAND MUSSELS.

OFF the mouths of our larger rivers, in our estuaries, and along those parts of our British coast where the bottom is muddy, there may be found, in almost unlimited numbers, the Sand Mussel (*Mya arenaria*). The shells are strong, and held together at the hinge by means of a strong articulation, almost spoon-shaped. Gwyn Jeffreys has given a lively description of this mollusc, and of its various names. It appears to have a tolerably wide geographical distribution, forming one of the many articles of Chinese diet, and occurring off the coasts of the United States, where it is called the

"clam." It is eaten, and apparently enjoyed, in many places, about five thousand bushels being annually brought to the Boston market. The most noticeable features about this bivalve are the foot, which is wonderfully flexible, assuming the duties of a digger, or spade, a sharp wedge, or a bent hook—and the epidermis, which is prolonged into a tube, covering the excurrent and incurrent siphons. Not unfrequently they go by the name of the "gapers" among our fishermen, because the shells, when denuded of their epidermis, do not meet at one end. Their habit of life is to be buried upright in the sandy mud, with the siphon just projecting, and taking in fresh food and water at the same time. We have already glanced at their geographical distribution, a fact which always proves the

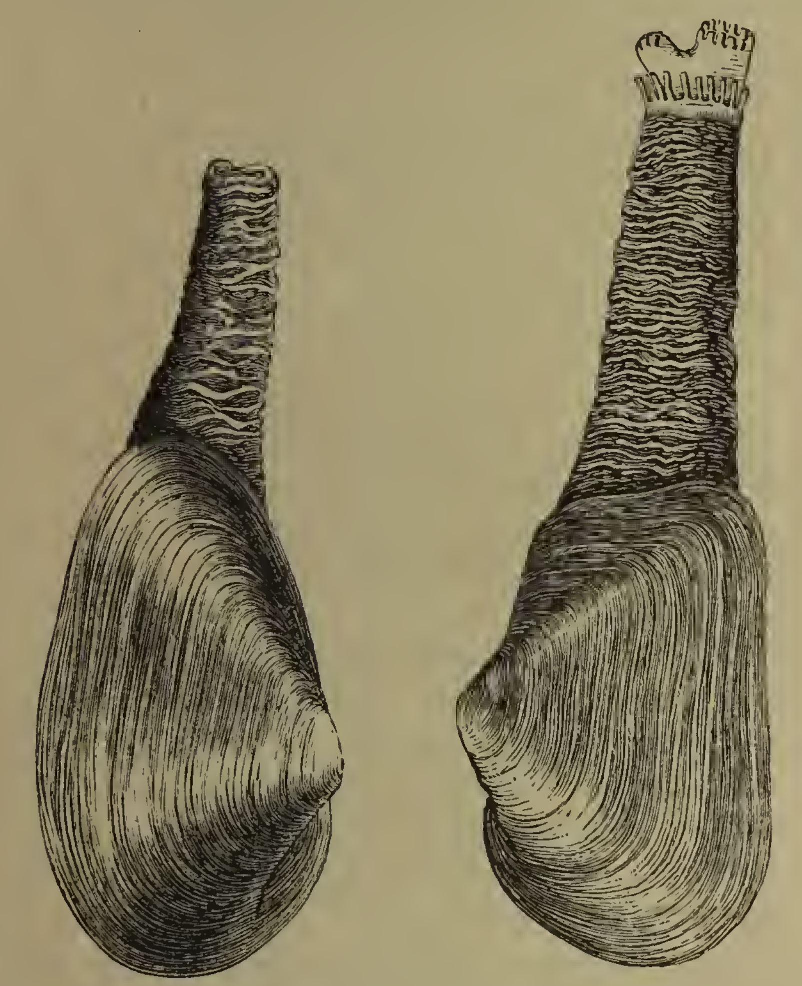

Fig. 117. Sand Mussel (*Mya arenaria*).

Fig. 118. Truncated Sand Mussel (*Mya truncata*).

geological antiquity of a species, seeing that it is indicative of the time required for it to spread over such an extensive area. This is true of the Sand Mussel. We find it in great abundance in the Norwich Crag, a pliocene deposit older than the Glacier epoch. It is even met with in the perhaps still older Red Cray. At Aldeby, in Suffolk, fossil Sand Mussels are very abundant, and are seen with both valves united, standing upright in the stratum of sand, just as they did when alive, untold centuries ago.

The Truncated Sand Mussel (*Mya truncata*) is even an older form, geologically speaking, for fine specimens are met with in the early Pliocene formations, as in the Coralline Crag of Suffolk. It is generally regarded as possessing more of an Arctic character than the foregoing species. In the living state it occurs as far south as the Black Sea (where it may have been brought during the Glacial epoch) and in the Bay of Biscay. Northerly it is far more abundant, swarming in the seas off Greenland and Massachusetts, and even off Vancouver's Island. Its occurrence in the latter locality is very significant, as this area is situated so far off the other places where it is abundant, and the most ardent stickler for "special creation" would never contend for two special creations of the Truncated Sand Mussel in two places. Therefore the species must have been long enough in existence to have been distributed by natural causes, and these widely-severed localities of distribution afford a good idea of the physical changes which have occurred since the species came into existence. In Arctic seas it is sought after and eaten, not only by man, but by the walrus, Arctic fox, and wild ducks. Professor Otto Torell is of opinion that the walrus rakes it up from the mud by means of its long tusks. Off the North American fishing-grounds Gwyn Jeffreys tells us it is equally esteemed a dainty article by the cod. The Arctic variety of this species is of a very persistent type, and was named by Professor Edward Forbes *Uddevalensis*. This variety occurs in the fossil state in considerable abundance in the Post-glacial beds of the Firth of Forth and elsewhere in Britain. The ordinary form of *M. truncata* has even been found on Moel Tryfaen, seventeen hundred feet above the sea-level, thus affording us a good idea of the climature of the sea which existed in North Wales when the land was submerged to the above depth. As a rule, the Truncated Sand Mussel is found living in the open sea, thus far being distinguished from *Mya arenaria*, which is of more littoral habits.

J. E. TAYLOR.

SNAKE-FASCINATION.

THAT certain animals are endowed with the faculty of fascinating their prey, so that they become incapable of offering any resistance, is now generally admitted as an established fact; nevertheless there hangs over the subject a *soupçon* of mystery which induces most naturalists to avoid it altogether, or to declare their disbelief in a phenomenon which they have never taken the trouble to investigate.

The mesmeric power is possessed by serpents in a very high degree, and is supposed to have its seat principally in the eye. There are those who cut the gordian knot by saying that the excessive lustre of this organ simply bewilders the victim; but this rough-and-ready method of solving the problem is hardly borne out by what is known of the method of fascination.

A snake, when about to put forth its terrible power, remains perfectly motionless, with neck in-

flated and head erect, while the victim gradually approaches its enemy, till at last it is received with open jaws. It is easy to understand how a squirrel—poor little beast—might be bewildered by the continued and voracious glare of a cobra, but surely such bewilderment would induce the squirrel to run away as fast as his legs could carry him—certainly not to march complacently to execution. No, it is very evident that "to fascinate" means something more than "to bewilder,"—save and except in certain milliners' shops, where a customer is very apt to get bewildered by the succession of "fascinating novelties" so pertinaciously thrust before his eyes. Then, again, we cannot agree with Dr. Barton, who has investigated fascination as regards serpents, and who appears to think that birds—the objects on which snakes most frequently exercise their powers—are only subject to their attacks when they build on or near the ground in marshy and snake-frequented districts, where first the young birds, in attempting to fly, and afterwards the parents, in defending their offspring, fall an easy prey to their expectant foes. No exhibition of mesmeric power is required in such a method of capture; in fact, it differs as much from true fascination as "chalk from cheese."

Dr. Bird gives an apparently well-authenticated instance of fascination exercised on a human being. It appears that two boys lighted by chance on a large black snake, and one of them determined to discover whether the creature, so celebrated for its powers, could fascinate him. He accordingly advanced to within a few yards of the snake, which raised its head with a quick motion, and, as the lad says, something appeared to flash in his eyes, like the rays of light thrown from a mirror when turned in the sunshine. The brilliancy dazzled his eyes and confused his brain, so that he fancied himself in a whirlpool, every turn of which brought him nearer to the centre. His comrade seeing him gradually approaching nearer and nearer to the snake, ran and dispatched it. It can hardly seem improbable that man should be fascinated by serpents, since we have on record several instances of such animals as antelopes and goats falling victims to the mesmeric faculty.

There is a certain African snake called the Boomslange (*Bucephalus capensis*) which possesses no poison. It frequents trees, and is furnished with large eyes and teeth directed backwards, to enable it to hold its prey with greater firmness. The presence of one of these creatures in a tree is soon discovered by the birds of the neighbourhood, which fly round it, uttering loud cries, until one, more panic-stricken than the rest, actually touches its jaws, and is immediately snapped up. During these proceedings the snake has its body coiled round a bough, with its head raised ten or twelve inches, the mouth open, and the neck inflated. Apparently it is well aware of the terror excited by its own appearance, and tries to look as ferocious as possible, knowing that the more savage it appears, the more food it will obtain. Dr. Smith, after giving an account of this reptile, in his "Zoology of South Africa," concludes by saying: "Whatever may be said to ridicule fascination, it is nevertheless true that birds, and even quadrupeds, are, under such circumstances, unable to retire from the presence of certain of their enemies; and, what is even more extraordinary, unable to resist the propensity to advance from a situation of actual safety into one of the most imminent danger. I have heard of instances in which antelopes and other quadrupeds have been so bewildered by the sudden appearance of crocodiles, and by the grimaces and contortions they practised, as to be unable to flee, or even move from the spot towards which they were approaching to seize them."

The Rev. Henry Bond, cited in Gosse's "Natural History," relates how, one day in August, he was attracted by the fluttering agitation of a hedge-sparrow in a hawthorn bush. Regardless of the presence of an observer, the bird continued its remarkable motions, getting, at every hop from bough to bough, lower and lower down in the bush. Drawing nearer, Mr. Bond saw a snake coiled up on the ground, but having its head erect, watching the sparrow.' The moment the snake saw him, it glided away, and the sparrow flew off with its usual mode of flight.

These instances might be multiplied indefinitely, and prove the existence of the fascinating faculty in snakes beyond the shadow of a doubt. It might, perhaps, be expected that, after giving so many examples, I should put forth some theory to account for them. In common with far wiser and more experienced men, I must confess my utter inability to do so. It seems to me that, apart from all questions of "spiritualism," human beings possess, in a greater or less degree, a mesmeric power: this I take to be beyond question. It is therefore natural to suppose that a faculty possessed by men and serpents, in each case nearly the same in its effects, and the same as regards the concomitants of its exercise, is also the same in all other essential points. Consequently, if we can discover the causes and nature of the faculty in man, we shall be able to elucidate analogically the conditions of its existence in the snake tribe.

Meanwhile we can only lay down that the power of fascination is possessed by harmless (in the sense of non-poisonous) as well as by poisonous serpents, and that it may even be present in crocodiles, tigers, cats, or possibly—as it has been maintained elsewhere (page 30) in the present volume—by *all* carnivorous animals. In the case of snakes it seems really necessary; for, since they are not furnished, like other animals, with legs and wings, their mo-

tions are consequently but slow, and without the mesmeric power they would have some difficulty in procuring the food requisite for their sustenance.

Blackheath. HENRY A. AULD.

MICROSCOPY.

SELF-DIVISION OF DIATOMS.—Professor Smith, speaking of the subject of self-division of the diatoms in the *Lens*, remarks:—"It may be objected that if by self-division the frustules become smaller, then the persistent filamentous forms, at least some of them, should, upon measurement, actually exhibit this gradation in size. I reply that this is the case, and in a filament of thirty-seven double frustules of a large *Melosira moniliformis*, I find the middle frustules larger by ·0001" (with the one-eighth objective, thirty divisions of my Powell and Leland thread micrometer), and so repeatedly of other chains of frustules. It would not at first appear that the largest frustules should be at the ends, and not the middle of a filament. We must remember, however, that although the two larger primary valves may be carried to the ends if the filament remains unbroken, yet all the time self-division is occurring between; so that a series of nodes or swellings will exist all along the chain. For example, if after the formation of, say, half a dozen frustules, so nearly the same size that we may consider them equal, we now suppose self-division to occur simultaneously, so that each frustule produces six others; then these latter, smaller than the older ones, would be distributed throughout the chain, and these again, all simultaneously dividing, would give rise to still smaller ones interposed; and it is manifest that a chain would very likely be severed at the smaller frustules, and the partial filaments would have the larger and older (perhaps thus more siliceous) frustules, near the middle, unless we should chance to find one of the ends with the valve of the primary frustule, which would rarely happen."

CRYSTALS OF THE WILLOW.—Can any of the readers of SCIENCE-GOSSIP tell me a good method of obtaining salicine crystals from the willow as microscopic objects?—*C. E. B.*

COLOURED LIGHT.—Can any of your readers kindly give me the reason of the following phenomenon? I have a slide of leopard's hair mounted in balsam, and on being placed under the microscope, *out of focus*, two or three of the hairs appear coloured—orange down the centre of the hair and blue at the edge. On adjusting the focus properly, the colour entirely disappears. What is the cause of only one or two being coloured like this? I may mention that the microscope I use is an achromatic compound one, and the light that of an ordinary candle. —*Ernest G. Spiers.*

CIRCULATION OF BLOOD IN A FROG.—It may be interesting to some of the readers of the SCIENCE-GOSSIP, who have never seen the circulation of blood in any animal, to experiment on a frog. When a frog is caught, tie up its head, body, and three of its legs in a bag, leaving one of its hind legs hanging out. Then put the latter under the microscope, and the circulation will at once be seen going on. When the experiment is finished, the frog may be let go, none the worse for the examination it has undergone.—*J. L. J.*

NEW BRITISH ALGÆ.—Mr. E. M. Holmes has described two new species of British Algæ in *Grevillea* for July, under the names of *Callithamnion hormocarpum*, and *Nitophyllum thysanorhizans*. The former has capillary fronds densely tufted, one to two inches high, and of a pinkish-purple colour. Both species are from the neighbourhood of Plymouth.

ZOOLOGY.

NEW NATURAL HISTORY SOCIETY.—We are glad to notice the formation of a new Natural History Society at Whitchurch, in Shropshire. The first meeting was held in June, when the President, the Rev. W. H. Egerton, enlarged on the claims which natural history questions had on all intelligent people. The committee and secretaries appear to be very energetically pushing forward the society, which is certainly well situated, both geologically and botanically.

THE YOUNG OF THE BATRACHIA.—It is well known that most of the batrachia are hatched in a form very different from that which they ultimately assume, the young animals living in the water in the form of tadpoles. A few species, however, furnish exceptions to this rule, such as the Surinam toad, in which the young are developed in little pits in the back of the female, and an American frog, the female of which has a regular pouch under the skin of her back, in which the eggs are retained until the young animals are sufficiently developed to hop about and seek their own living. M. A. Bavay has brought to our knowledge another exception to the general character of the Batrachian group. A tree frog (*Hylodes martinicensis*) is abundant in Guadaloupe, an island formed almost entirely of volcanic rocks, and on which fresh water exists only in the form of streams so violent as to render the existence of such creatures as tadpoles almost an impossibility. M. Bavay's attention was thus called to the development of the frog, and he has found that it passes through its tadpole stage,

develops its legs and casts its tail while still in the egg, so as to issue therefrom in its perfect form, although still of small size.

Fauna of Lake Utah.—The water of the Salt Lake of Utah has been supposed to be devoid of life, but a naturalist in Professor Hayden's expedition has found its saltest portions swarming with a little crustacean, which appears to be identical with the European brine shrimp (*Artemia salina*). This little creature, which is one of the most highly organized of the lower crustacea, is commonly found in the strong brine of the salt-pans established in the European coasts. In fact, it used to be said that the salt-workers at Lymington judged when the brine had attained the strength requisite for the final operations by the abundance of the brine shrimp in it. Two forms of brine shrimp have already been detected in America,—one at New Haven, the other in very salt water from the Mono Lake, California. Professor Leidy thinks that these and the forms from Utah are merely varieties of the European species. He states that gulls and other birds were observed by him about the Salt Lake, and that pelicans are said to abound there. From their presence he suspects that fishes may exist in the lake. Its shores swarm with a small black fly, which appears to pass its larval stages in the salt water.

Deep-Sea Life off the Norwegian Coasts.—The Rev. Thomas Hincks, F.R.S., has contributed an article to *Nature* on this interesting question, based on the investigations of Mr. G. O. Sars, son of the well-known Norwegian zoologist. In 1868 this gentleman, by dredging at the depth of 450 fathoms, added no fewer than 335 species of animals to those already published. Among the new forms thus obtained was *Rhizocrinus lofotensis*, a crinoid descended from Oolitic ancestry. Off the coasts of Norway there occur "great deeps," which have been especially fruitful in zoological discovery. The most remarkable among the many new forms brought to light is a polyzoon called *Rhabdopleura*. Mr. Hincks calls this a rudimentary and half-developed kind of polyzoon, representing an early stage in the evolution of the latter. *Rhabdopleura* is a polyzoon, and yet not *all* polyzoon, a large portion of the structure, while clearly taking the polyzoan direction, differs widely from that of all known polyzoa. The digestive system is of the polyzoan type, but of a much lower grade than is found elsewhere. There is but little specialization of parts; the stomach and intestine consisting of a simple tube. The tentacular apparatus in some respects approaches that of the fresh-water polyzoa. Prof. Sars regarded this interesting species as an organism standing halfway between the hydrozoa and the polyzoa.

A Gigantic Lobster.—About the middle of June last a huge lobster was brought up in a trawl net in Plymouth Sound, quite perfect, which measured 3 feet 2 inches from the tips of the claws to the end of the tail. Its weight was 15 lb. 2 oz. Attached to the shell were various marine organisms, such as oysters, barnacles, &c. This lobster is believed to be above one hundred years old! Few of his race are likely to have such a long tenure of existence in British seas.

A "Missing Link."—There is still living in Australia a reptile called the "Frilled Lizard" (*Chlamydosaurus Kingii*), which has well-developed teeth, biconcave vertebræ, and a long rat-like tail. This lizard habitually runs about on its hind legs, seldom or never touching the ground with its fore feet. The latter are but feebly developed.

Nesting of the Woodcock.—Two authentic instances of this bird having nested in England have lately been afforded in Suffolk. In the first case a nest containing four eggs was found at Ufford, all of which were hatched, one young bird having been left dead in the nest. The other case was that of a deserted nest containing four eggs, found at Ixworth.

Man and Apes.—Mr. St. George Mivart has concluded his exhaustive articles on "Man and Apes" in the July number of the *Popular Science Review*. Those who wish to make themselves acquainted with the zoological and physiological differences and affinities of the two groups ought to read these well-written and thoroughly readable contributions.

Female Octopus.—This creature, at the Brighton Aquarium, has laid her eggs, which she guarded with the greatest vigilance. The *hectocotylus* of the male has recovered its normal condition. Mr. Saville Kent thinks that the *Octopus tuberculatus* (D'Orbigny) will prove to be the male of *O. vulgaris* on closer investigation.

BOTANY.

A New Potato Disease.—A new kind of potato disease is reported as having appeared last year in the crops at Apolda, near Jena. This disease attacks the tuber at once, without apparently injuring the haulm. The tuber is found covered with a kind of felt, of a purplish colour, which is the mycelium of a fungus. The tuber is not always penetrated by this mycelium, but generally it is destroyed by a cancerous disease, the skin being covered by a number of black dots. The geological formation is that known as the Keuper, and in the district in question last summer was remarkably dry. This new disease appears in the autumn.

Bog Mosses.—Dr. Braithwaite is continuing his exhaustive descriptions of the Bog Mosses in the *Monthly Microscopical Journal*.

Parasitism on Flowering Plants.—A capital article on this subject appears in the July number of the *Popular Science Review*, from the pen of Dr. Trimen, illustrated by several well-executed lithographs.

The Origin of the Garden Artichoke.—Since my former notice on this subject my attention has been drawn to an interesting article in the *Gardener's Magazine* for January last, which goes very far to prove that the *Cynara scolymus*, as also the Cardoon, are both modifications of one and the same plant,—*Cynara cardunculus*, which is indigenous both in Southern Europe and Northern Africa. It should be borne in mind, however, that the *C. cardunculus*, like the *C. horrida*, is one of the *Thistle tribe;* and it appears from a notice in the *Gardener's Magazine* of last month, under the head of "Edible Thistles of Syria," that several thistles are found there edible, as well as the *Cynara horrida*, one of them being "much prized;" and Messrs. Burton and Drake declare "it is in fact a wild artichoke, and far superior in flavour to the cultivated species." It is not improbable, therefore, that if brought under cultivation it might produce plants scarcely if at all differing from the garden plant, the origin of which would in that case still remain doubtful, especially as many of the Thistle tribe (as in the *Cynara cardunculus* and the *C. horrida*) have characters strongly resembling each other. (See Wood's "Tourist's Flora," under the heads Carduus and Cirsium and their *hybrids.*)—*T. B. W.*

The Artichoke.—It is stated in the History of Cultivated Vegetables by Phillips, that the French artichoke, *Cynara scolymus*, grows wild in the fields of Italy, where it often attains the height of a man. Both Greeks and Romans appear to have procured this plant from the west of Africa, about Carthage, as also from Sicily. Pliny mentions this plant to have been esteemed, and to have obtained a higher price than any other garden herb. He was ashamed to rank this vegetable amongst the choice plants of the garden, being in fact no other than a thistle. He states that the *thistles* about Carthage and Corduba cost the Romans annually six thousand sesterces, and concludes by censuring his countrymen in serving up such things at table as the very asses and other beasts refuse, for fear of pricking their lips. It is also stated that the commoners of Rome were prohibited, by an arbitrary law, from eating artichokes. A commentator of Dioscorides, Hermolatus Barbarus, who died in 1494, relates that this vegetable was first seen in the Venice gardens in 1473, at which time it was very scarce. A few years previous to that time it was, however, an object of cultivation in other parts of Italy. It was brought to this country during the reign of Henry the Eighth, about 1548. In the Privy-purse expenses of this king we find several entries regarding artichokes. "Tues. Paied to a servant of maister Tresorer in rewarde for bringing Archecokks to the kings grene to York place, iiijs. iiid." A treatise written in the reign of Mary, on "the best settynge and keepynge of artichokes," is still preserved in the Harleian library, of which it forms the 645th number. —*H. G. G., Park-place, Highgate.*

British Marine Algæ.—We are happy to draw attention to a work now issuing in sixpenny parts, which we feel confident meets a want. It is on the British Marine Algæ, and gives a full and popular account of the sea-weeds of this country, with hints for their collection and preservation. Each part is profusely and artistically illustrated, and when we say the author is Mr. W. H. Grattann, we have said enough to recommend it. Mr. Grattann is, undoubtedly, one of the best of our British algologists.

"White Apple."—James Pearson, in p. 117 of Science-Gossip, desires information concerning the "White Apple" of Audubon. From the field-notes of my father, Dr. C. A. White, made while he was director of the State Geological Survey of Iowa, I learn that it is *Psoralea esculenta* (Pursh.), and of course belongs to the family Leguminosæ. It has a starchy, tuberous root, about the size of a hen's egg, covered with a leathery coat. It grows quite plentifully on the prairies of all the region drained by the Big Sioux. The leaves are palmately quinque-foliate, and the plant has somewhat the appearance of *Lupine*. It was called "Pomme Blanche" and "Pomme de Prairie" by the early French voyageurs, and "Tipsinah" by the Sioux Indians.—*C. E. White, Iowa.*

GEOLOGY.

Precious Stones in California.—Professor B. Silliman has recently called attention to the probable occurrence of small diamonds in the sands left in the sluices of hydraulic washings in California. A microscopic examination of a sample of these sands, from Cherokee, in Butte county, revealed the existence of numerous crystals of hyacinth or zircon, associated with crystals of topaz, fragments of quartz, black grains of chromite and titanic iron ore, and a few small masses of a highly-refracting substance, which, from its physical and chemical characters, is believed to be true diamond. The occurrence of diamonds in California has long been known, although not under these circumstances.

The Glacial Phenomena of the Hebrides.—Mr. J. F. Campbell, F.G.S., at the last meeting of the Geological Society gave his observations of indications of glacial action in various islands of

the group of the Hebrides. Heynish in Tiree is 500 feet high, and has many large perched blocks on its top. These blocks are of gneiss, and the author thought they came from the north-west. The Barra islands are described as rocky, and resembling the hill-tops of a submerged land. All ice-marks found by the author seemed to him to come from the north and west. He thought that the final grinding was given by floating ice when the land was more submerged than at present. At Castle Bay, in Barra, the author observed well-preserved glacial striæ at the sea-level in a direction from N.N.W. The whole island is glaciated and strewn with perched blocks. Glacial indications were also observed in South Uist, Beuberula, and Skye; and the author stated that, on the whole, he was inclined to think that the last glacial period was marine, and that heavy ice came in from the ocean, the local conditions being like those of Labrador. Mr. Campbell regarded most of the lake-basins of the Hebrides as formed by ice-action, and considered that the ice by which those islands were glaciated came from Greenland.

Fossil Man.—The American naturalists have lately been devoting further attention to the fossil human skeleton of Guadaloupe, and the result of their investigation goes to support the idea that it is one of the Carib race. This admission, however, still allows that it may be of considerable antiquity.

A large South African Diamond.—A diamond of the first water, weighing over 288 carats, has been discovered at Waldeck's Place, Vaal River, South Africa. It measures one inch and an eighth in diameter; so that it is one of the largest rough diamonds known. Its form is that of an irregular octahedron.

Crustacean Footprints.—Dr. Dawson has described the occurrence of limuloid crustacean footprints in the millstone grit beds of Nova Scotia, made by an animal not more than half an inch in width. No other remains of limuloid crustaceans, however, have as yet been found in the carboniferous strata of that country.

Coal Strata of the United States.—Professor Hitchcock states that the total area of the coal-fields of the United States amounts to 230,659 square miles; besides those coal strata which belong to other formations than the carboniferous, as for instance, those of Virginia (Triassic), of the territories west of the Missouri river (Cretaceous), and those in California, Alsska, &c.

The Origin of Guano.—The deposits of guano are usually supposed to be the excrements of birds. Dr. Habel has investigated this matter microscopically and chemically, and has found that, after treating the substance with an acid, the insoluble residue is composed of fossil sponges and other marine animals and plants precisely similar in constitution to such as still exist in those seas. The fact that the anchors of ships in the neighbourhood of the guano islands often bring up guano from the bottom of the ocean, is quite in opposition to the prevalent belief. Dr. Habel therefore considers that the deposits of guano must be the result of the accumulation of fossil plants and animals whose organic matter has been transformed into nitrogenous substance, the mineral portion remaining intact.

NOTES AND QUERIES.

Can Snails reason?—Some weeks ago I took a cluster of hybernating *Helix aspersa*, but finding most of the shells weathered, I placed them, along with a dozen others, in a box, to be used as opportunity offered for colonizing with. On the 3rd inst. a thunderstorm occurred here, succeeded by rain. The following morning my snails were all out of the box, and had fixed themselves at different elevations on the yard and house walls. Having collected them together again, I replaced them in the box, and removed it beyond accidental reach of the petticoats, attributing the displacement of the lid to this cause. In the evening, at dusk, upon inspection of the box, the lid was observed to move, and my attention being drawn to the circumstance, I watched proceedings. In a few moments the lid was slid, by a series of lateral jerks, until an aperture was made sufficiently large for me to watch the animals at work. I then saw some eight snails on the box-side actively enlarging the cavity by inserting their heads therein, and, drawing up their bodies, thrusting the lid towards the other side by means of their shoulders. About the same number were on the lid, backs downwards, engaged on the same object. Indeed, it must have been those on the lid attempting to thrust their bodies through a small nick caused through the warping of the cover, that first made the breach. Evidently the lid had been displaced the night previous by a like process, and the snails were again anxious for a ramble. As the efforts of the snails must have been directed simultaneously at one point, what but the knowledge that it required their united powers exerted in a given direction to accomplish a certain purpose could induce them so to act, and how could that knowledge be attained but by a process of reasoning?—*H. Gornall.*

New Insect-Net.—I believe the time is almost gone by when the naturalist had to conceal his implements from the vulgar eye. I myself have always openly carried my net, &c., wherever I have used them, and have not been in any way annoyed. However, if "J. R. S. C." or any other friend would like to make a net according to my plan, capable of being taken to pieces and joined together again, he may do so in various ways. The steadiest and strongest would be to saw through the bamboo, a little below *a a* in the drawing, and fix a screw into one part and a socket into the other; but I recommend retaining the original construction. Weight in the ring gives extra inertia to the net, so that it will easily retain the motion given to it; but the

same property will prevent the easy reversion or alteration of the motion, which is so necessary in chasing most insects.—*Frank Allen.*

Glasgow Botanical Club.—Can any of your readers inform me if there is any club or society in Glasgow for the purpose of improving their knowledge of botany by trips, &c.? If so, the name and address to apply to for admission would oblige; if not, the writer would be willing to join with any person for the formation of such a club in Glasgow. —*E. W. E. H.*

Ornithogalum umbellatum.—On some hilly pasture land, surrounded by thick woods and plantations, far removed from any garden from which it could have escaped, it was with much pleasure that I and a friend came upon numerous plants of *Ornithogalum umbellatum*, the Star of Bethlehem. I have frequently seen this flower in gardens, but have never before met with it growing wild, though in other parts of the country it may perchance be common.—*J. Anderson, jun., Alresford.*

Southern Birds.—In reply to "H. G.'s" question, I send the names and a few particulars of birds which are, I think, identical with those he describes:—1. "A large brown bird, called by the sailors 'stink-pot,'" is, doubtless, the Hoactzin, or Stink-bird (*Opisthocomus cristatus*). This bird is 24 in. long, the wing 13 in., and the tail 11 in. It has a slender body, rather long neck, and wings that extend to the centre of the tail, which is composed of ten long broad feathers, graduated at the sides. The plumage on the nape, back, wings, and portion of the tail-feathers is brown, the hinder quills being enlivened by a metallic green gloss, the feathers of the wing-covers whitish, under-parts light rust-red. It has a long flowing crest. The Hoactzin is peculiar to the northern parts of South America. The flesh has an unpleasant odour of musk combined with that of wet hides, called by the Brazilians *catinga*, and it is therefore uneatable. So powerful is the musky smell that the natives employ the flesh as bait for certain fish. 2. "'Parson-birds,' with white marks upon their faces," are probably synonymous with the Widow-duck (*Dendrocygna viduata*). This species has the face and throat white, the back of the head, nape, and sides of the neck bright reddish-brown, back reddish-olive, darkly-spotted tail, and entire under-side below the breast black; sides of the breast like the back, reddish-olive, darkly spotted and marked; sides of the body greyish-white, striped with blackish-brown. The white marks on the face and throat, and the dark colour round them, with black below, doubtless suggested the name Parson-bird as well as Widow-duck. All travellers who have visited South America describe this bird as occurring in amazing multitudes, more especially in the marshy grounds of the prairies, and travellers in Africa assert that it is equally abundant in the southern and western regions of that continent. 3. "Ice-birds," beautiful little creatures, slightly larger than Mother Carey's Chickens, with delicate silvery-grey plumage. These are Ice-gulls (*Pagophila*), but these, I think, chiefly inhabit the Arctic regions. The "Ice-birds" may possibly be white or silky terns (*Gygis candida*),—beautiful birds, with slender bodies, the plumage of silky softness and pure white. The White Tern inhabits the Pacific Ocean. Mr. Cumming states that on visiting Elizabeth Island, in the South Seas, which is entirely destitute of inhabitants or fresh water, he found this, or an allied species. Darwin, in his "Journal of Researches in Geology and Natural History," speaking of Keeling Island, says: "There is one charming bird, a small and snow-white tern. Little imagination is required to fancy that so light and delicate a body must be tenanted by some wandering fairy spirit." 4. "Molly Manks," nearly as large as albatrosses, with white bodies and dark wings. The Wandering Albatross (*Diomedea exulans*), called also the Cape Sheep, is, with the exception of its black wings, entirely pure white. These birds vary in size from 10 to 14 feet across the wings. It is possible the "Molly Manks" may be a small bird of this species, or the Yellow-billed Albatross (*Diomedea chlororhynchus*), smaller birds, which have the *tail*-feathers, however, also brownish. 5. "Whale-birds," about twice as large as storm petrels, with white bodies and dark wings. I cannot find a satisfactory description answering to these birds; the nearest approach to it is that of the Broad-billed Prion, or Duck Petrel (*Prion vittatus*), which is peculiar to the southern hemisphere. The colour of the plumage is light greyish-blue on the back, and pearl-white on the under-side. The borders of the wing and tail-feathers are black. Length, 10¼ in.; breadth, 22 in.—*H. H., Shrewsbury.*

Singing Mice (p. 91).—I fancy these are much more frequent than some observers may think, but their vocal performances are often made at times and in places where human listeners don't take cognizance of them. One was noticed in a house in Chelsea rather crowded with poor tenants, and created some wonderment, as it migrated from floor to floor, though it was scarcely ever seen, and all efforts to entrap it failed. By general testimony the sound was rather a low whistle than the song of a bird; and this favours the theory that it is consequent upon some disease of the breathing organs. So that the truth may be that what some folks call a "melody" is nothing more or less than an asthmatic wheezing. There does not appear to be any necessary connection between the fact that some mice do thus utter sounds from some cause, and the well-ascertained fact that they are susceptible to musical influences as a species—with differences.—*J. R. S. C.*

The Devil's Coach-horse (*Ocypus oleus*), (p. 115).—There is no doubt that this beetle has an odour peculiar to itself, and not agreeable, though at some times it is scarcely noticeable, and it is, perhaps, in some way connected with the food upon which the beetle has been preying. I can hardly think that it is of a defensive nature, as in some other species. At night *Ocypus oleus* is said to be occasionally luminous; but this I have never observed myself. Why should it have received the name of the "Devil's Coach-horse" in our vernacular? Its imp-like appearance and seeming malignity might connect it with the powers of evil; but the movements of the insect are too tardy to suggest a comparison to a quick goer of the equine species, such as our ancestors admired, when railways and steam were only dreamt of. Unless, indeed, the name contains an allusion to the old funeral conveyance, now likely to be superseded.—*J. R. S. C.*

Rosa arvensis.—Professor Babington and Dr. Hooker agree in calling this rose "scentless." I cannot help thinking libellously. As far as I can judge, in its typical form (*R. arvenis* proper), it certainly has a decided, though delicate, fragrance, and that peculiar to itself and very different from that of any other wild rose with which I am

acquainted. Its odour is suggestive of that of the "*tea-scented*" rose of cultivation, and has much the same character. Has any one noticed the scent of the closely-allied *R. stylosa*, now reckoned as a subspecies under the general head of *R. arvensis?* Sir J. Smith, who alone, as far as I know, has mentioned the subject, says only that it is "fragrant." ("Eng. Bot." ed. i. t. 1795). It would be interesting to know if the two plants had this (very subsidiary) character in common.—*R. A. Pryor.*

British Shrews. — Will some contributor or reader of Science-Gossip kindly inform me how many species of shrews are placed on the British list?—*W. H. Warner, Kingston.*

Do Fishes move after Death?—"D. H. F.'s" question is somewhat of a hibernicism, but I would state, in reply, that they do sometimes move after being *apparently* dead. This is especially the case with the gobies, which are very tenacious of life. I have found them live for a considerable time under strange conditions: *e. g.*, on being transferred from salt to fresh water, and even after being put into spirits of wine and water; and they will continue to breathe for a lengthened period after being removed from the water, and, when apparently quite dead, will revive on being restored to salt water. If the change from salt to fresh water be effected gradually, they live as well, in one as in the other, and become very attractive objects for the aquarium.—*L.*

White Apple.—An esteemed American correspondent has sent us what, he believes, is a reply to Mr. Pearson's query (Science-Gossip, May, 1873), relative to the "White Apple," in the form of an extract from the *American Agriculturist* for June, 1820:—"A large share of the vegetable food of some of the Western tribes of Indians is the Prairie Apple, or *Pomme Blanche*, as it was named by the French *voyageurs*. It is the root of a Psoralea (*P. esculenta*), which is found from Wisconsin westward to the Rocky Mountains. The plant grows about a foot high, has leaves with five divisions, and its flowers are clustered in a dense head, much resembling a large clover; the flowers are purplish-blue. The root is turnip-shaped, and somewhat farinaceous; and though it would be considered scarcely edible by us, is gathered in large quantities by the Indians, and stored for the winter."

Mespilus.—In answer to Mr. Wilkinson's inquiry, in the May number of your Magazine, as to the locality in which the *Mespilus germanica* may be found, I beg to state that having for some time resided at Blechingley, in the neighbourhood of Redhill, and having while there taken some little interest in the flora of the district, I shall be most happy to communicate with Mr. Wilkinson, if he will favour me with his address. I remember having met with a tree at Nutfield, with which I was not then acquainted, and which answers in every point to the description given of the *Mespilus* in Babington's and other floras.—*Walter Leslie.*

A Domestic Calamity.—History being always welcome, I venture to chronicle a somewhat unusual incident which occurred in my garden yesterday. A pair of spotted fly-catchers built their nest lately on one of the capitals of the columns supparting our portico, a water-pipe being on one side, and the house-wall at the back. I and my family have been much interested in watching the proceedings of these pretty, innocent little birds. Judge then our dismay, when sitting out under a tree near, we observed the hen bird *and nest* suddenly descend to earth, and both execute marvellous gyrations thereon. My son easily caught the bird, with nest attached, when the cause of this domestic disturbance became manifest. A woman has been, by misogynous old batchelors, said to be at the bottom of all mischief. It proved so in this case, for having used a woman's long hair in the construction of her nest, the little bird had got its head and neck through a loop of the said hair, and, on attempting to leave her nest, had brought both herself and it and four or five eggs to grief!—*Windsor E. Hambrough.*

Chickens and Sparrows.—We have some young bantams in our yard, which are much annoyed by the sparrows, which come to eat their rice. It was amusing this morning to see a chicken, six weeks old, seize a sparrow by the head and hold him for quite five minutes. It made such a noise that it attracted a cat; but the chicken now became alarmed in her turn, and allowed the sparrow to make its escape. I think it will not again interfere with the bantams' food.—*H. F. M.*

Cossus.—Mr. W. H. Spicer, in his article on *Cossus*, errs in stating that the larvæ of *C. ligniperda* is not an oak-feeder. I could show him an oak-tree at Selhurst, from which I took last autumn more than thirty larvæ. The tree in question is completely riddled from the ravages of this moth. Looking about a fortnight since to see if any had changed, I found one in the chrysalis state, and on examining the cocoon more closely, I found a small hole bored through it; on breaking it open I saw a small *ligniperda* larva in its first year, which had eaten its way through the cocoon, and was then feasting on the chrysalis of the large one. It had eaten nearly half; it could not have been for want of food, for it had plenty. Is this an usual occurrence?—*W. L. Sarjeant.*

Tortoises.—Your correspondent "E. M. P." asks in the last number of Science-Gossip if tortoises are known to be destructive to vegetation. We have kept a tortoise for the last two years for the purpose of eating slugs and snails. I have never seen it eating any, but, on the contrary, its carapace is often covered with them, and it does not make the slightest attempt to eat them. It has often been caught in the act of eating the young leaves of plants, especially of the *Spiræa.*—*Brian Rigden, Canterbury.*

Mistletoe.—In your last interesting number of Science-Gossip, subject, "On the Legends and History of certain Plants," the writer states, speaking of mistletoe, the seed is in fact carried by birds. Now, nothing is so easy to propagate as mistletoe. At our President's seat, Ynisygerwnn, near Neath, I have lately seen a small orchard of apple-trees, with a plant on nearly every tree, from the one-year-old just developed two-leaved plant to the more extended branches of every consecutive year up to eight, which last is a fine bushy plant, almost sufficient of itself to decorate a baronial hall. In fact, nothing is so easy to propagate, and all the plants in this orchard were raised in this way: Obtain a berry and squeeze it with the thumb into the wrinkled or cankered bark of the apple-tree, and in the course of the next year you will be sure to discern the germ of the young mistletoe. It seems to me, from

this circumstance, that the seed is not carried by birds, but as the berry becomes dead ripe the seed is blown away by the wind, until it settles in the congenial bark of a tree suited for its parasitic habits, and there it germinates, and in time, being left alone, becomes a fine bushy plant. As this fact is not generally known, I send it, thinking possibly it might interest some of your readers, who would like to watch the growth of a young mistletoe.—*W. T. Bell.*

The Contents of a Fish's Stomach.—A few days ago I was curiously induced to make an examination of the contents of the stomach of a fish. The fish was caught in the river Eden, running from Ennerdale Lake, in Cumberland, and is known by the inhabitants of the neighbourhood as the "bull" trout, differing in appearance, though possibly not in character, from the "lake" trout. The weight of the fish was rather less than half an ounce, measuring in length about seven inches. The stomach was necessarily small, and its contents only weighed 3·5 grains. Owing to the smallness of the numbers, I have calculated the results of my analysis into per-centages. Of course, as might be expected, and as may seem from the following table, the food of the fish was principally animal matter (flies). Owing to the flies having undergone the process of mastication, it was impossible to form any correct idea of the species or genus, even though viewed carefully by the aid of the microscope. I found the contents of the stomach to consist of,—57·4 animal matter (flies); 23·2 water; 13·5 silica (sand); 3·1 peroxide of iron; 3·1 undetermined; total 100. Persons unfamiliar with the river Eden and neighbourhood would be unable to account for the presence of oxide of iron and silica in the contents of the stomach of the fish. This, however, I can account for, because, after rain, the water invariably contains matter in suspension: this matter I have found to consist of oxide of iron, silica, and organic matter, the former, and perhaps a portion of the silica, being acquired from the iron-ore workings at and near Cleator, on the banks of the river. This idea may be of some use to the angler, as it shows that fish, at all events of the kind in question, not only feed upon flies and other animal matter, but upon siliceous earth. Whether the presence of oxide of iron and silica in the stomach of a fish is injurious, or whether the former acts as a tonic, I shall not venture to say. I may here remark that I have found the water of the Eden to contain 7·1 grains solid matter, in solution, per gallon, consisting of chloride of sodium (common salt), carbonate of lime, sulphate of lime, a little sulphate of soda, and a trace of chloride of magnesium. As the river Eden runs, not through a very populous, but agricultural district, it seems probable that this solid matter may, in a great measure, be acquired from the washings off highly-manured fields, which are always liable to drain into the river. The sample of water from the river Eden was collected near its outlet into the sea, where it had probably acquired all the solid matter which was at its command. The "bull trout" mentioned is the *Salmo eriox* of Linnæus. As the fish in question was not large, it may probably have been the young of the *Salmo eriox.*—*W. H. Watson.*

Nightingales and Tortoises.—In reply to "E. M. P."—1. Nightingales will sing in deer parks. I have frequently heard them in Richmond Park, Surrey. 2. The common tortoise (*Testudo Græca*) is destructive to vegetation, feeding very freely on dandelion, lettuce, &c. It is not of much use in a garden, except as an interesting ornament, being almost vegetarian in its diet, and not having any partiality to snails or slugs. —*A. B.*

Queen Bee and Drones.—Will any of your correspondents inform me whether the queen bee is ever impregnated in the hive, or is she obliged to leave the hive in company with the drones for that purpose? And what is the cause of the drones being found dead outside the hive, with their wings extended as though set out for the cabinet?—*A. B.*

Vipers swallowing their Young. — There are several mysteries in natural history which require clearing up—so says Mr. Couch in last month's Science-Gossip. Had Mr. Couch been, as he says, a "curious man," I think he would have said whether the young found in the stomach of the viper he dissected were alive, and if not, whether they had any appearance of decomposition; for I am afraid we shall have to lay to the viper another charge,—that is, cannibalism. I took out of a viper I caught a short time ago, a full-grown lizard; so I am rather inclined to think that if they will devour lizards, they will do so with their own species. I had the good fortune to capture a large female viper, which produced nine young ones after I caught her. In this case she did not take any notice of her young family; on the contrary, she showed all the symptoms of rage when they came near her. If they (the female vipers) do swallow young ones, how are we to know whether the young ones they swallow are their own progeny or those of another reptile? I think these are some of the mysteries which, as Mr. Couch says, require clearing up. I caught, on the 2nd of June, a viper about 18 in. long, with a black stripe down its back; the stripe was about quarter of an inch broad; this was bordered on each side with a light yellowish stripe. Is this colour of a common occurrence among viper-catchers? I took from its fangs sufficient poison to make two or three slides for the microscope.—*Jas. Kirby.*

Additions to Irish Flora.—*Hieracium tridentatum*, discovered by me in county Fermanagh, July, 1872.—*Rev. S. A. Brenan, Altedesert, Pomeroy.*

Oldest Tree in Great Britain.—I would refer your correspondent to a work called "Sylva Britannica; or, Portraits of Forest Trees distinguished for their Antiquity, Magnitude, or Beauty. Drawn from Nature by Jacob Geo. Strutt." The bull oak in Wedgnock Park, seat of the Earl of Warwick, one of the most ancient parks in England, according to Dugdale, who informs us that Henry de Newburgh, the first earl after the Conquest, in imitation of King Henry I., who made the park at Woodstock, did empark it. This tree, if still living, the "Magazine of Natural History," vol. iii., 1830, states, in their opinion, to be one of the oldest trees of the kind remaining in the country. Mr. South, in a letter addressed to the Bath Society, describes this ancient lord of the forest.—*S. A. B.*

The Food of Tortoises.—In reply to "E. M. P.," I beg leave to state that the food of land-tortoises is essentially and almost exclusively of a vegetable nature. Possessing no teeth, the jaw is much better adapted for tearing and cutting plants than for crushing and masticating certain of the lower

animals. These creatures are said to destroy insects, earth-worms, slugs, and snails; but the cases, whenever they occur, are, I suspect, merely suppositious ones; for no author appears to set them forth upon his own experience; and in Mr. Murray's history of the Peterborough tortoise ("Experimental Researches") we are informed that that individual discarded "all animal food"; and, finally, Swainson says that land-tortoises "feed only upon roots and vegetables." Goldsmith states that in hot countries tortoises have actually been kept for the express purpose of destroying bugs! It is more than probable that the appetites of this species have been confounded with those of the well-known *Testudo Europæa*, which is a member of a carnivorous genus. Mr. White's "Timothy" appreciated lettuces, the leaves and stalks of dandelions, the sow-thistle, grass, and cucumber. In confinement they have been known to devour currants, raspberries, strawberries, gooseberries, pears, apples, peaches, nectarines, and various kinds of gourds, as well as endive, green peas, leek, the flower of the dandelion, the pulp of oranges, cabbages, corn, and bran. This long list will show how destructive this reptile can become in a garden; in fact it will do a vast deal more mischief than good. To keep them for amusement a hole should be bored through a part of the shell, and a piece of string leading from it to a stake or tree. In this humane way our Peterborough friend is said to have existed for more than 220 years!—*E. Halse.*

Zonites glaber.—I answer to "A. P.," *Zonites glaber* was first discovered and described by Mr. Miller; in 1822 he published it in his "List of Shells about Bristol."—*E. H.*

Tortoises.—In the interesting article by Mr. E. Halse in your number for June on the Tortoise and its Skeleton, he states that he "was always under the impression that this species [speaking of the tortoise now so commonly seen in this country] was *Testudo Græca*." He then says that he was "forced to come to the conclusion that it is *Chersina marginata*," and adds: "May not the land tortoises said by Pliny to inhabit the desert of Africa, and called by him *Chersinæ*, be this species?" It may indeed be *T. Mauritanica*, which is also very abundant in that region. Mr. Halse does not seem to be aware that the tortoises which are sold so cheaply by the London costermongers come from Africa. These creatures are collected in the neighbourhood of Mogador and Saffi, and exported to this country packed in barrels. Mr. Halse's conclusions as to the species are therefore confirmed by the locality from which the tortoises are derived. —*Arthur Leared.*

Bees and Glow-worms.—Would any of your readers or intelligent contributors let me know through Science-Gossip whether the following is a common circumstance or not in the apiary, and if not, how can it be accounted for on rational grounds?—A young hive of bees belonging to John Pender, Esq., M.P., at Minard Castle, Argyllshire, left the skep on the 26th May last, settled down at a short distance and was secured in the usual way. Two days after, another hive left, but after settling down on a bush close by for a short time, returned to the skep; and this it continued to do at intervals of one and two days for six successive times. The last time it came off, the hive flew to a distance of twenty or thirty yards farther off than on the preceding occasions, and skepped in the afternoon. The gardener who has charge of the apiary tries to explain the circumstance by there being no queen bee, but is not sure. The hive on the 26th May was the first we heard of in this district. Last night (17th June) when walking home about 11 o'clock, I saw a large number of glow-worms by the road-side in a small pass, and secured two of them. So far as I can learn, they have never been seen there before. How have they come, and is it the male or the female that emits the phosphorescent light, which I noticed is given forth from sub-posterior part?—*J. A.* [It is the female insect which "glows," the male is winged.—Ed. S. G.]

Dytiscus and Mussel.—When pond-hunting recently, I saw on the bank a few inches from the water a *Dytiscus* beetle, which to my surprise made no effort to escape. On closer inspection, I found that a small mussel, about half an inch across, had attached itself to one of the beetle's antennæ, and held on to it. I transferred the "attached" couple to one of my bottles and took them home. The next time I looked at them, some eighteen hours later, I found the beetle was dead, the antenna was broken off and still remained in the mussel's grasp. It is remarkable that such an active and powerful insect should have been entrapped by a small mussel. It would seem that the creature's instinct prompted it to leave the water to rid itself of its troublesome companion. Was the beetle or the mussel the aggressor?—*H. E. F., Wood Green.*

The Nonpareil.—The Nonpareil or Painted Finch (*Cyanospiza Ciris*) is a bird imported from the Southern States of America; it combines both great beauty of colour and loveliness of song; it is easily kept in confinement on summer rapeseed, fruit, German paste, and enjoys grape-juice or a piece of lump sugar in its water; it is also fond of flies, mealworms, &c. With care and attention it will live for years, and breed in confinement.—*J. S. Metcalfe, Kendal.*

Songs of Birds.—"P." will find Neville Wood's "British Song-birds," or Syme's "Treatise on British Song-birds," to fully answer all his requirements, though Keuleman's "Natural History of Cage-birds," now in course of publication by Mr. Van Voorst, when completed, will be far the most magnificent work in the English language on the subject. It will contain a full account of the song-birds of all countries, our own included, together with a beautiful plate coloured by hand of every species. Mr. Keuleman is one of the best ornithological draftsmen living, and "P." and all lovers of our British song-birds ought to patronize his work. Mr. Dovaston once proposed to Bewick to rewrite for him the whole of the birds, wherewith, from early and lasting habits, he was well acquainted, their characters and manners, interspersed with anecdotes. Such a work has been produced for our wild flowers in the last edition of Sowerby's "English Botany," but for our birds, Mr. Dovaston's proposal is still a desideratum. Respecting the distinction between the song of the Nightingale and Blackcap Warbler, I may say, from years of experience of both species, both wild and in confinement, that there is no resemblance, though in many works the authors would lead their readers to suppose such was the case; their meaning generally is not that their song is closely alike, but that the Blackcap nearly approaches the Nightingale in the quality of its song. The Nightingale's song reaches to three octaves, is abundantly varied, at

times hilarious and at others mournful, and is much louder in tone and better sustained than the Blackcap's; the song of the latter is more often mutilated, though very early in the morning, in the spring time, it sings with great persistence, and with far greater effect than later in the day: its closing trill is richly wild and enchanting; but if "P." heard the two birds once or twice, he would never mistake the song of one for the other.—*J. S. Metcalfe, Kendal.*

Botanical Locality Record Club.—All persons desiring to become members of this club, who have not yet sent in their names, are requested to send them to Mr. T. B. Blow, Welwyn, as soon as possible. The number of members is limited, and only a few more can be admitted.

Naturalists' Field Clubs (p. 165). — Your correspondent "J. G." will find every information respecting the above in the "Guide to the Natural History Societies of London," price twopence; published by the Saturday Half-holiday Committee, 100, Fleet-street, E.C.—*M. A. H.*

Pearls.—In answer to your correspondent "R.M.," who asks the reason of pearls turning black, you can insert the following, unless any correspondent gives a better answer; viz.—If "R. M." examines a section of pearl, he will find it is formed of layers of cells, the centre being similar to the pith of wood, which, if kept in contact with the skin, absorbs the perspiration, which being acted upon by the air, turns blackish. Soap, or any other greasy substance, will injure pearls in a similar manner by being absorbed. Pearls cut in half turn quicker than whole ones. The reason some keep their colour longer than others, is on account of the cell being more minute.—*W. W. Jones.*

Singing Mice.--Having seen some notices of singing mice, about which I had been very incredulous, I have a fact to record, of which others may be as incredulous as I formerly was. A short time ago I had been a little more wakeful than usual, and was aroused by the voice of a chirping little songster in close proximity. I listened with no little wonder to the song. It was that of a veritable singing mouse, and its song continued four or five minutes, gradually getting sweeter and lower until it died away. —*J. Sim.*

Microscopic Postal Cabinets.—Some two or three years ago I proposed a plan similar to that suggested by Mr. Atkinson in Science-Gossip for May; but being at that time unable to find others like-minded, my scheme fell to the ground. I should like slightly to alter Mr. Atkinson's proposal in this way; viz.—For a dozen members let there be two small boxes provided, size of each $1\frac{1}{4}$ in. deep, $1\frac{1}{2}$ in. wide, $3\frac{1}{2}$ in. long—*without rack;* these would each hold one dozen objects, separately wrapped in several folds of tissue-paper: each member could then put in two objects instead of one. In addition to the objects, a few sheets of white paper, pinned together by one corner, should be added for queries, remarks, suggestions, and replies, a new lot being added each month; but the old one should always take the circuit twice, after which any suggestion of interest should be copied out by the president and sent to the editors of Science-Gossip and the *English Mechanic*, the papers themselves being retained for the society by the president. With respect to entrance-fee, as each member will pay his own postage, I think sixpence will be sufficient, yet I do not object to a shilling if thought desirable. I have now simply to add that if Mr. Atkinson will send me his address, I think I can guarantee him at least six members.—*Alfred Allen, Felstead, Essex.*

Roosting Habits of Birds.—Where do birds roost? Some perch on the ground, others in hedges and thickets, others creep into hollow trees, stacks, and barns, and many shiver the night through on the bare boughs of the trees, exposed to the pitiless blasts and bitter frosts of December and January. Now, there are two little birds of my extensive acquaintance, whose prudence and forethought in providing a snug roosting-place deserve record in the pages of Science-Gossip. The first of these is the common wren (*Passer troglodytes*), more familiarly known by the affectionate appellation of Jenny, or Kitty Wren. Every country boy knows pert Jenny's mania for building half-finished nests, and her jealousy if the nest is disturbed in any way. About the second week in March, 1868, I noticed a wren busily engaged in building in a patch of ivy in front of this house, and as is usually the case, she worked at it for a day or two with great determination, and after making a mighty fuss for a time, deserted it altogether. A few nights after I was smoking at the door, close to the ivy, and out of curiosity put my fingers into the nest, when, to my surprise, they came in contact with a warm feathery ball at the bottom. I hastily withdrew them, when out flew a wren, which poured forth a very agitated song while flying to a tree close by. The next night it occupied the nest again, and for several nights after. My next example is that universally-hated member of the British ornithology, the house sparrow (*Passer domesticus*). I hardly think the poor fellow deserves this wholesale condemnation, since his only crimes are looking out sharply for "number one"; and how few unfeathered bipeds in these times can say they are not doing the same? Purchase next week's penny "weekly," and "read up," in proof of what I say, under the head of "law and police." Leaving the dark page of the sparrow's life, let us now notice his sagacity in providing a snug nook in which to pass the cold winter nights. Everybody knows what a huge collection of hay, straw, feathers, rags, and the like, the sparrow collects together before the pepper-and-salt-looking eggs make their appearance; but everybody does not know that the nest is frequently used in winter as a snug roosting-place, having previously received a thorough renovation, and a vast increase in the quantity of bedding. The numerous broods of youngsters are generally all cleared out by August, and the owners of the nest left in possession. In the autumn and winter of 1870, I noticed sparrows busily at work carrying feathers and other materials into an ivy-covered spruce fir growing near this house. On October 10th I saw a female with feathers in her bill, on the branches. On seeing me she dived into the ivy, and hid herself from view. Four days later, I twice saw a male with feathers, which he dropped on discovering me. Again on November 16th I saw another male with feathers in his bill, which were again dropped. The birds had evinced good taste in the selection of materials, as the feathers dropped were all soft, fluffy, and warm. Years before this I had noticed with pleasure the sagacity of the sparrow. On one occasion, in particular, a sudden and sharp frost came upon us quite unexpectedly, and next morning our little colony of sparrows was busily engaged in collecting materials, and debating the subject with many chattering *pros* and *cons.*—*W. H. Warner, Kingston Abingdon.*

NOTICES TO CORRESPONDENTS.

We must remind our friends, who make use of this column that the following rules should be strictly adhered to:—First. That perfect specimens be sent. Secondly. That all the information as to habitat, &c., that the inquirer can give should be forwarded with them. Thirdly. To bear in mind that drawings, unless very perfectly executed, are useless, and a tyro is very apt to omit some distinctive characteristic which would enable the examiner to decide the genus and species of the object sent. Lastly. Never to send an object for identification until the inquirer has used his best endeavours to find out for himself all the information he requires. Questions are very frequently sent, which the slightest effort on the part of querist in looking through some elementary treatise would have given all the knowledge required.

F. W. S.—Your specimen is the Bladder Fern (*Cystopteris fragilis*). not uncommon in mountain limestone districts. We have frequently seen it growing in your neighbourhood.

S. W. M.—Will you be good enough to send us your address? By some means it was left out by the compositors at the last moment.

T. W.—Your specimen is the spreading silky Bent-grass (*Agrostis spicaventi*).

A. Allen.—Thanks for the slide. There can be no doubt you have succeeded in improving the preparation.

James C.—*Gymnogramma sulphurea* is a Jamaican fern, and was introduced into this country in 1808.

E. S. Petre.—Your specimen arrived in a high state of decomposition. You should have sprinkled it with carbolic acid before sending it. It is the Long-eared Bat (*Plecotus auritus*).

W. Wakefield.—The book that will, we think, meet your requirements is "Half-hours in the Green Lanes," just published.

Henry B.—Your grass is the Bearded Darnel (*Lolium temulentum*), and a dangerous species.

James Jackson.—We do not know of such an agent as the person you name.

T. W. R.—Castleton, in the Peak district, is one of the best places we know of for collecting mountain limestone specimens. Salt Hill, near Clitheroe, in Lancashire, is another good locality.

Frank Durghan.—Yours was an *advertisement*, not an *exchange*, and therefore ineligible for the latter column. Apply to Publisher for terms. The cheapest way would be to get a cabinet made. For pattern see article on "Collecting and Preserving Birds' Eggs," in the April No. of Science-Gossip for 1872.

F. Allen.—You may obtain the tin tubes from Messrs. Rowney or any other artist's colourman in London. Will not the collapsible tin tubes sold by any perfumer at a very cheap rate answer your purpose?

G. F.—Your slide reached us safely. Please accept our thanks for it. Answer next month, all being well.

F. H. Cass.—You will find the best advice we know, of how to prepare skeleton leaves, in an article on that subject published in the February No. of Science-Gossip for 1873.

Alliaria.—The book you mention is the one to which we referred. Also, procure Mrs. Lankester's "Wild Flowers worth Notice" (London, Hardwicke), with coloured plates. You will gain a much better knowledge of botany by working out the common species for yourself than by getting them named for you. After all, the mere knowledge of the *names* of plants is but a poor botany! The specimens sent are—1, Charlock (*Sinapis arvensis*); 2, Rest-harrow (*Ononis arvensis*); 3, Common Hedge-mustard (*Sisymbrium officinale*); 4, Corn Chamomile (*Anthemis arvensis*); 5, Wood spurge (*Euphorbia amygdaloides*); 6, Hedge Wound-wort (*Stachys sylvatica*).

EXCHANGES.

Wanted, Live Specimen of Ringed Snake (*Coluber natrix*). State what required.—W. K. Gordon, 3, Gordon-street, Nairn, N.B.

A good Collection of British Birds' Eggs for Fossils or Butterflies.—F. W. W. Corden, Mrs. Robinson's, opposite White Lion, Streatham.

Excellently prepared Slides of Sections of Hoofs and Horn for Polar, for Diatoms unmounted, either recent or fossil. —H. P. Thomas, Boston, Lincolnshire.

Rare British Plants, including flowering plants, Mosses, Seaweeds, and Lichens, &c., offered for Foreign Plants possessing medical properties.—Address, E. M. Holmes, 17, Bloomsbury-square, London, W.C.

Wanted, Species of Foraminifera, or good Sea-soundings. Good slides or birds' eggs given.—Address, F. F. Grenstead, 3, Brewer-street, Maidstone.

For living Melicerta send small tube or bottle and box with stamped address to H. E. Freeman, Rose Villa, Wood Green, N.

Twenty-seven parts of Cassell's Natural History for British Lepidoptera.—Silvester Greenwood, No. 4, William-Edward-street, Waring-green, Brighouse, Yorkshire.

Eggs of Raven, Purple Heron, Green Woodpecker, Kingfisher, Cuckoo, Quail, Swift, Redlegged Partridge, and Spoonbill, for equally good eggs. Unaccepted offers not answered. —Fred. Anderson, Alresford, Hants.

Cocoons of *B. quercûs*, and divers Lepidoptera for other species.—Jos. Anderson, Jun., Alresford, Hants.

Parasite of Mow Harrier mounted in balsam for any good entomological slide.—E. Lovett, Holly Mount, Croydon.

Permian Fossils and Ichthyolites from coal-measures, for Foreign Marine Shells.—G. W. Rowbotham, 219, Regent-road, Salford.

Well-mounted whole Insects (Spiders, Dragon-fly Larva, Notonecta, Saw-flies, and the like) for any good slides of other objects.—E. Moulton, 41, State-street, Newburyport, Mass., U.S.A.

Xenodochus carbonarius, on Burnet-leaf, for good and perfect unmounted objects (other than fungi).—J. T., 10, Davenport, Stockport.

Well-mounted Slides of Scorpion Fly (*Paroipa communis*) and leg of *Dytiscus marginalis*, for slides of Elytræ of Male *Acheta domestica* (showing file); and Opivositor of one of the Cynipidæ or Gall-fly.—J. O. Harper, 2, Prospect-place, Dereham-road, Norwich.

Wanted, Specimens of Breeze-flies (*Tabani*) and Gad-flies (*Gasterophili*) preserved in spirit, or mounted or unmounted parts of the same. Slides or unmounted objects offered.—H. M. J. Underhill, 7, High-street, Oxford.

Desmids—*Tetmemorus, Enastrum xanthidium, Cosmarium*, &c., mounted, for other good mounted objects.—John C. Hutcheson, 8, Lansdown-crescent, Glasgow.

Dytiscus marginalis, and Micro Fungi for their equivalents in Micro Fungi, &c.—The Rev. J. E. Vize, Forden Vicarage, Welshpool.

Vanessa Io, Peacock butterfly, Larvæ of, for Microscopic material: please send list.—Rev. Jno. Hanson, 14, Bagby-square, Leeds.

Eupodiscus Argus.—Well-mounted slides for other Diatoms mounted and named. Send slide and stamped address to M. D., 116, Esplanade, Deal.

Monthly Microscopical Journal, 1872, and *Grevillea*, vol. i., offered for good microscopic slides.—J. Sargent, Jun., Fritchley, near Derby.

Good unmounted objects offered for a few fresh stems of *Equisetum hyemale*.—W. White, Litcham, Norfolk.

Fossils from coal, shale, and other formations, for other Fossils.—Charles Cockson, 24, Rodney-street, Liverpool.

Ferns (living) wanted for Microscopic Slides. Send list to R. J. L., 26, Commercial-street, Leeds.

BOOKS RECEIVED.

"Popular Science Review." July. London: Hardwicke.

"Monthly Microscopical Journal." July.

"Les Mondes."

"Boston Journal of Chemistry."

"Journal of Applied Science." July.

"Astronomical Register." July.

"British Marine Algæ." Parts 1 and 2. By W. H. Grattann. London: the "Bazaar" Office, Wellington-street.

"American Naturalist." July.

Communications received up to 14th ult.—W. R. H. —W. W.—J. A.—J. F.—J. C. H.—G. W., Jun.—E. M. H.—E. M.—F. F. G.—H. A. A.—E. L.—E. H.—A. L.—A. A.—W. W. J.—G. H. K.—T. W. B.—J. S. S.—H. G. G.—E. E.—J. S. M.—E. S. D.—T. W.—R. H. N. B.—E. W.—S. G.—H. E. F.—J. T.—J. B.—R. H. W.—W. H. G.—C. E. B.—W. H. G.—A. A.—J. K.—F. W. S.—S. A. B.—C. B. B.—H. G. T.—W. B.—H. M. J. U.—M. T. M.—R. M.—J. O. H.—M. A. H.—W. H. W.—A. B.—W. G.—C. E. W.—W. T. B.—M. A. H.—F. D.—W. D. S.—B. R.—F. W. W. C.—J. A., Jun. —F. A., Sen.—F. A.—G. W. R.—J. A.—E. G. S.—E. L.—C. A.—W. L. G.—J. L. J.—F. H. C.—T. C. O.—G. S. B.—G. F.

REMARKS ON THE IRREGULARITY OF APPEARANCE OF SOME SPECIES OF MARINE ALGÆ.

By W. H. GRATTANN.

FOR a number of years at different periods of my seaweed gatherings, I have been struck with the frequent irregularity of appearance of many species of Marine Algæ on different parts of our coasts, some species being found in abundance during one season, and either sparingly the following year, or not again for several seasons; while others will suddenly appear in quantity, and, in the course of a season or two, as unaccountably disappear altogether.

As the contents of this paper are the result chiefly of my own personal experience as a collector of British seaweeds, I will give a number of instances of the irregularity of growth and appearance of several of our common, as well as our rare algæ.

About fourteen years ago I paid a visit of six weeks to Plymouth and its vicinity, devoting the whole of that period to the science of algology; not merely in collecting plants and mounting them, but in studying and almost watching their growth, and observing various peculiarities connected with marine vegetation which seemed to me peculiarly interesting, and different in so many respects to anything I had observed in land plants. I naturally went prepared to make a great collection, and invented for the purpose a press capable of receiving a hundred plants at one time, and many a night I sat up at my work, until the first streaks of morning warned me to desist: but in truth, I believe I am a good finder, and as I daily collected a vast number of specimens, I cared more to preserve my "treasures of the deep" than my health, and so I was (as I have said) at it, day and night, for six weeks. In addition to my seaweed press, I went armed with a good compound microscope, and thus during the operation of preparing plants for my herbarium, I had constant opportunities of studying and examining the structure and fructification of algæ in the fresh living state; than which no objects in nature with which I am acquainted are, when examined fresh from the water, more curious and beautiful. My studies were thus a constant living enthusiasm, for not only was my primary investigation a never-ending source of delight to me, but upon every occasion of portions of seaweeds being subjected to examination, the microscope revealed to my delighted eyes numbers of tiny marine creatures, some of which were clinging to the plants, others were chasing each other, either in sport or as prey; and again, I occasionally met thus with beautiful and rare diatoms, minute zoophytes and young brittle stars, and many other wonders of the deep, some of which were familiar to me, others new and strange.

Two instances I may mention, as they occurred on a memorable day. It was that in which the *Agamemnon* came into Plymouth Sound after her first voyage in returning from laying the Atlantic cable. I had that day been down to the great Mewstone Rock, to gather some specimens of the rare *Callithamnion brachiatum,* which grew luxuriantly on the tips of the large oarweeds on some rocks below Langden, some five miles down the coast. These rocks, my boatman said, were called "the Sliders," and not by any means an inappropriate

term, as I proved, for in getting upon them, the better to secure a good supply of my much-prized little Rhodosperms, the wash of the sea caused me to slide completely off them into deep water; but a rope from my ready boatman soon remedied this misfortune. The day was warm, and I was used to salt water, besides I had my hands full of Callithamnion in fruit, although my pockets were full of water. I said my plants were in fruit, and so they were indeed; some full of tetraspores, others having their crimson branches loaded with favellæ containing spores, like bright-red baskets full of shining crimson grapes. But this was not all, for on the tips of the branches of some of the specimens I discovered numbers of fine diatoms, and among them there was the most perfect specimen I had ever seen of that remarkable species, *Licmophora flabellata*, or fan-bearer. This elegant diatom is, I believe, very rarely found perfect. Its little fan-shaped frustules are extremely brittle, and frequently, before the diatom is discovered, its structure is broken up, and fragments only are then obtainable. The contemplation of this beautiful object was the source of much delight to me; but what I saw soon after arrested my attention, and amazed me more than anything I had ever beheld. I had been reading, only a few weeks previously, Dr. Pritchard's account of the Vorticellæ, and here, before my eyes, in a few drops of water only, attached to a branch of the Callithamnion, was a living colony of these remarkable animalculæ. It was wonderful to see the beautiful little bells of the Vorticellæ thrust out ever and anon their long stalk-like necks, extended to their full length, and then gracefully drawn back again, and closed down upon their bases. But to return to the seaweeds. A day or two after the above occurrence I was rowing up the Hamoaze towards Devonport, when I came in contact with one of the mooring buoys as it rolled round and round with the force of the tide. Observing something red on one of the rings, I watched my opportunity as the buoy rolled towards me, and snatched a handful of growing plants, of what proved to be *Chrysimenia* (now *Chylocladia*) *rosea*. This was a great surprise to me, for hitherto I had only obtained this plant from northern collectors; the species being a native of the Orkney Islands, and never, so far as I then knew, having been found further south than Filey, in Yorkshire. However, there it was, unmistakably, *Chylocladia rosea*, formerly *Orcadensis*, of Harvey. I was informed soon after by Dr. Cocks and Mr. Boswarva, of Plymouth, that they had each taken specimens of this rare plant that season, all of which were growing on the mooring buoys in the harbour. The following year the plant had entirely disappeared, and was not found again for several seasons, and then in entirely different situations.

About the year 1858 I took some remarkably fine specimens of that rare and beautiful plant, *Gloiosiphonia capillaris*, growing some distance up the river Plym; but although I left plenty behind me, growing luxuriantly, I never found the species again there, or within a mile or two of the place. And, again, as regards a peculiar form of *Callithamnion cruciatum*, taken by Mr. Boswarva and myself some years previously, not a specimen of the species occurred in the same locality for several years, and those that *were* taken were of the normal form, no trace of the peculiarities we detected in the former plants being observable in any of the recent ones. This was a source of regret to enthusiastic algologists like my friend and myself, and the more so, as the late Mrs. Griffiths, who examined some of our newly-discovered plants, pronounced them to be a form of the species entirely new to her. One day while dredging in Plymouth Sound with Dr. Cocks, I think in the summer of 1858, I found, in one of our hauls, a remarkable form, of what I thought at the time was *Microcladia glandulosa*, a rare deep-water plant; but Dr. Cocks not being satisfied with either his or my opinion concerning it, forwarded the specimen to Professor Harvey, who after a careful examination of its structure, returned the plant, saying that it was undoubtedly new, and was intermediate between *Ceramium rubrum* and *Microcladia*, and that he proposed naming it "*Ceramium microcladia Cocksii*." This particular plant is still in my possession. I have never taken another specimen of it, neither have I heard of any plant at all answering to its description having been taken until this season (1873), when, very recently, I was informed that some specimens of a peculiar *Ceramium* or *Microcladia* had been met with in Plymouth Harbour, which answered perfectly the description I had given of my former novelty. I have, however, had no opportunity of examining these plants at present; but it would be interesting indeed, if, after a lapse of so many years, this remarkable plant should have again made its appearance.

I may here remark that the species *Ceramium rubrum*, like the beautiful *Plocamium coccineum*, may justly be regarded as cosmopolitan, since both these species are found in all seas, although the size, colour, and condition of each of them depend greatly on the depth of water in which they vegetate. Those which grow in situations where they are uncovered by the tide, are usually stunted in form, and turn very dark in drying; while specimens which are cast up from deep water are of a rich crimson, and large enough sometimes to cover a folio page. There are two varieties of *C. rubrum* which, until very lately, ranked as distinct species; but Professor Agardh has, I think very properly, united them in the small group of which *C. rubrum* is the type. These varieties are by no means common. One is known as *C. botryocarpum*, the fruit being produced in clusters like bunches of grapes.

The other is *C. rubrum*, var. *decurrens;* the internodes of the stem and branches being traversed by a decurrent line, or faintly-marked stripe.

Microcladia glandulosa proper was found by Dr. Cocks in 1851, in rather considerable quantity, and by myself soon after in similar abundance; but my friend rarely met with it afterwards, and I never took it again, neither at Plymouth nor elsewhere.

But still more remarkable was the appearance of a single plant of *Codium bursa*; discovered by Dr. Cocks on one of the mooring buoys in Plymouth Harbour. But it was the first and the last, for not a single specimen of this rare plant was ever again taken by either of us, and up to the present time I have never heard of another being discovered in that locality. Now the appearance, or rather I should say, the non-appearance of this singular plant, except in some few localities, is really very extraordinary. Professor Harvey gives the following list of stations as its only recorded places of growth:—"Coast of Sussex; Shores of Cornwall; South Devon (near Torquay), and Belfast." The only habitat known to me is one outlying rock, at extreme low-water mark, between Brighton and the village of Rottingdene, and although I sought diligently for several seasons successively, all along the coast, east and west of Brighton, and indeed, on every shore, and in every locality where seaweeds grew, I never met with a single specimen of this rare and curious chlorosperm. It may be that its very peculiar form, which is that of a round green shiny-looking ball, misleads the uninitiated, and that it is thus occasionally overlooked; but I, for one, know it well, and I am sure I have never missed it, and have often wondered at its extreme rarity. There is another plant belonging to the same order as this rare *Codium bursa*, which is, in my opinion, one of the most beautiful of our native green seaweeds, and although by no means a rare species, is, so far as my experience concerning it goes, singularly capricious as to its growth and appearance in the same situation for even two years consecutively. I allude to *Bryopsis plumosa*. I have taken this plant in very many different localities and in tolerable abundance, but in no instance in the same locality two seasons consecutively. Many years ago, I took several very fine specimens in two or three rock pools at Hastings and St. Leonard's; but although I visited those watering-places for several seasons afterwards, I found no more of this elegant and much-prized alga. Since my sojourn in Torquay I have sought in vain for characteristic specimens of it, but I have only met with stragglers here and there, a stray plume or so, but no one instance of a well-grown tufted plant of *Bryopsis plumosa*. On the other hand, I have been fortunate in meeting with the far more rare species, *B. hypnoides*. The first time I found it was late in the summer of 1871, in a little rock pool far up in those cavernous recesses round the corner of Corbon's Head, so high up, indeed, that only at the highest state of the tide could this rocky shelf to which I refer, have a chance of a water supply, much less an influx of spores of seaweeds. This species is so extremely delicate in its ramification, and so faintly apparent in the growing state to ordinary observers, that although I removed a portion of the plant, I left more than two-thirds of it still attached to a plant of one of the calcareous algæ on which I found it growing. This season I found it had disappeared; but in a deep rock pool, about twenty yards lower down, and fortunately not very accessible to ordinary pedestrians, I detected, at a depth of more than two feet, numbers of fine tufts of this rare species growing luxuriantly. This, of course, was a secret delight to me; for although I took sufficient to make a dozen specimens for various algological friends, I left an ample supply to propagate and diffuse the species around this favoured locality. I found this rare plant occasionally at Plymouth, but on no other part of the English shores. The genus *Punctaria* contains three beautiful species, two of which, *P. latifolia* and *P. plantaginea*, are generally met with in spring and summer. But the species *tenuissima* I have never taken since I found it on one of the groynes near the pier at Brighton. Mrs. Griffiths and others found it formerly growing on *Chorda filum* off the Hesketh beach, where this long string-like alga may be seen during the summer months imparting an olive tint to the water near the gentlemen's bathing-place, on account of its profusion there; but although I have searched the rock pools all round this coast, and swam about even among the plantations of this long slimy seaweed,—a dangerous experiment by the way,—I have never met with a single specimen of this rare *Punctaria*. Some algologists specially mention the *Zostera marina*, or grass-wrack, as its peculiar place of parasitic growth; but of the vast quantity of this prolific plant that has, during the last two or three months, been cast ashore here in Torquay, and even flung, by the force of the tide, all along the top of the sea-wall in Torbay, not a fragment of it yielded one frond of the *Punctaria tenuissima*.

I have already spoken of the rarity, among the green weeds, of *Codium bursa*, and I now may mention as a precisely similar instance among the red subdivision of algæ, the very rare occurrence of the species *Griffithsia secundiflora*, which is often tolerably abundant in the Channel Islands, but has not been found, so far as I know, in any other situation on the British shores, besides the sheltered bay at Bovisand, east of the Plymouth Breakwater, where it was first discovered by the Rev. Mr. Hore, in 1846. I have sought for this plant elsewhere in vain, and have applied to every collector for it with no better success; but as I never failed to find

it in Bovisand Bay, it certainly is very remarkable that no specimen should have been detected elsewhere even in the vicinity of this one habitat. As this beautiful *Griffithsia* is an annual, it must of course be propagated by fruit, though all the specimens that I ever took at Bovisand were destitute of even the appearance of fructification ; and this convinces me that the plant produces its fruit during the month of December or January, during which periods its place of growth is altogether inaccessible; for even during the lowest spring tides it is submerged to a depth of four feet or more, and no boat could approach the locality except when the water was smooth or free from swell, which I never found it there until the summer.

And here I may revert to a curious fact with reference to a species of *Fucus*, which, although belonging to the commonest group of plants, known as "rock-weeds," is yet one of the rarest in our marine flora. I refer to *Fucus Mackaii*, which was first found on the shore at Connemara, by Mr. Mackay, and is specifically named in his honour. It is said to have been found in Scotland, but my most diligent search in the most favourable localities in Scotland was never rewarded with a single specimen, neither have I taken it on any of the English shores ; the only specimen I possess having been sent to me from the north-west coast of Ireland. From the fact of this rare plant always being found unattached, without root or hold-fast, and lying among rocks or under the sides of large boulders, I am inclined to think it is a deep-water species, or that its place of growth is, at least, beyond low-water mark. It may readily be distinguished by its pendulous fruit, which is produced near the base of the lower branches.

There is a very beautiful species of *Polysiphonia* which is found occasionally at Plymouth, but very regularly and abundantly round the south-eastern coast of the Isle of Wight, especially at Ventnor. This is the species *P. byssoides*, the branches of which are densely clothed with closely-set branching fibres, which are not deciduous, but persistent, during the entire life of the plant. Some years ago I took this fine species in abundance at Hastings, every day regularly for a week or two, but for several seasons afterwards I did not see a single specimen.

The same capriciousness of appearance and disappearance in that locality and during the particular season referred to, applies to *P. fibrillosa* and *Arthrocladia villosa*, as well as *Bryopsis plumosa*, all of which I took that season at Hastings in unusual plenty, but never afterwards. One summer, too, I found cast ashore at St. Leonard's a beautiful form of the rare *Gloiosiphonia capillaris;* but this species I also never found there again. During the last three years I have been applied to by several of my algological correspondents for specimens of the rare *Gigartina pistillata* and *G. Teedii*. The former I never took anywhere but in Whitsand Bay, near Plymouth ; but the latter I have sought for in vain. Mrs. Griffiths found it, in former times, in one particular rocky cave at Elberry Cove; but although I very carefully examined every nook and corner of the rocks and shores all around Elberry, and indeed, all round Torbay, for three seasons, I have never found a single scrap of this species. I therefore conclude that it either grows in deep water or it is lost to us for the present. That extremely rare and most lovely plant, *Sphacelaria filicina*, used to be found at Plymouth in tolerable abundance, but of late years I have had the greatest difficulty in obtaining a single specimen from any locality. This beautiful Melanosperm grows abundantly in the Channel Islands, and is found in fruit there occasionally. Hitherto I have not been successful in finding it in Torbay, though I have no doubt it exists here. A single specimen of it was taken at Ilfracombe last autumn by a collector there, who wrote word to me, that it was the only one he had ever taken there. During my residence in that part of North Devon, I sought in vain for either of the *Sphacelariæ*, and as for the extremely rare *S. sertularia*, the only specimen I ever saw is a small fragment which was taken in Torbay many years ago, and is now in my possession. It is now generally regarded as a deep-water variety of *S. filicina*, and indeed was formerly described by Dr. Harvey as var. *patens*, from the spreading habit of its branches. However, it is very strange indeed that this lovely little plant is so rarely met with ; nothing, I fear, but careful dredging will ever reward the most enthusiatic algologist in his search for this rarity.

And, again, I may ask, who ever finds *Cladophora rectangularis?* The only specimen I possess was obtained from a collector at Roundstone Bay, on the west of Ireland, but I never found it on the English shores. Mrs. Griffiths took it occasionally in Torbay, but hitherto I have not been fortunate enough to find a single plant on any part of the Devonshire coast. Among the olive seaweeds there are two species which at present must certainly be considered rarities, though, if the dredge were in more general use, I am convinced that many a plant which is now looked upon as a rarity, would cease to be regarded as such, and I have little doubt that by this means occasional interesting discoveries would be made. Probably too, by this means, the very rare *Nitophyllum versicolor* might be found in other situations besides those which are already recorded. It is found, I believe, on some parts of the Irish coast, but its only known English habitats are the shores from Minehead, in Somerset, down to Ilfracombe and its vicinity. During a residence of ten months in Ilfracombe, several years ago, I was constantly on the look-out for this rare plant, but I never met with a scrap of it; and perhaps its scarcity

and irregularity of appearance may be due to the curious fact of this species never being found in fruit; in fact, the fruit is unknown; and how the species is really propagated, is at present a puzzle for algologists. The only specimens I possess were taken at Ilfracombe many years ago, and so I find was the single specimen which is preserved in the collection of algæ presented by Mrs. Griffiths to the Torquay Museum.

About ten years ago I went on a dredging expedition to the sheltered bay of Lamlash, in the Isle of Arran, and among the treasures of the deep which I hauled on board, were numerous fine specimens of *Bonnemaisonia asparagoides*, and the rare and most welcome *Stilophora Lyngbyæi*, which Dr. Harvey was with difficulty persuaded to admit as specifically distinct from *S. rhizodes*, regarding it rather as a deep-water form of the typical plant. To me it appears to be specifically distinct, not only in its ramification, form, and colour, but in some little differences that exist in the fructification. It is, however, only obtained in deep land-locked bays or harbours, where, like *Asperococcus Turneri*, another species of the same order, it grows to a large size, but unfortunately is not very regular in its appearance. I dredged again very carefully the next season in Lamlash Bay, but I did not obtain a single fragment of the species which were so abundant the former season. I took also during the first dredging bout, one very fine specimen of the very rare *Sphacelaria* (now *Chætomorpha*) *plumosa*. It was attached to a stone which came up in the dredge from a depth of 35 fathoms; but I have never met with this interesting Melanosperm since that time. At Whiting Bay, on the south shore of Arran, I found, two seasons successively, the rare *Callithamnion arbuscula;* but this species is, I believe, exclusively a northern plant, as is also *Callithamnion floccosum*, a most exquisite alga. It is a native of the Orkneys, but is obtained at Peterhead in fine condition. About eight years ago I received an olive seaweed from a friend at Donegal, which at first puzzled me greatly, for I had not only never taken it, but had never seen anything like it. I succeeded, however, in identifying it by means of a plate in a French Journal of Botany in the British Museum, as the extremely rare *Desmarestia pinnatinervia*. It has since been discovered by Dr. Becker near the Lizard, but hitherto, I am not aware that any other British habitat has been recorded. This is certainly a very remarkable, and I may be permitted to observe, a very original plant; for although it agrees in structure with wide forms of *D. ligulata*, it is unbranched and undivided, the frond being entire, and from two or three inches to a foot in length, while there is an evident midrib, or distinct vein traversing the frond throughout its whole length, from which spring opposite lateral veins or nerves.

It would be easy enough for me to multiply instances similar to these I have already described, of what I have long considered a caprice of nature peculiarly characteristic of marine plants, and especially so of seaweeds. I have often pondered as to the cause of the appearance of some species in unlooked-for localities, and then again the sudden disappearance of the same species and their complete absence for years. How are these irregularities in the economy and growth of seaweeds to be explained? Perhaps there may be several distinct causes which would, in some degree at least, account for them, and in the first place I will state my firm impression, that the scarcity of some local species in their accustomed places of growth, is due to the rapacity of collectors, some of whom are never satisfied with a share of a rare plant, but must grasp all they can lay hands on; and thus some species are eradicated, at least for a time. Another cause has recently occurred to me; but this has reference to the sewage question, and I hesitate to say much on such a disagreeable subject. Still I have little doubt that many a delicate plant has been destroyed by contact with various organic abominations, or driven to seek a place of growth in greater depths or purer situations. From this remark it will be perceived that I consider it a disgrace to our civilization as well as to our knowledge of how to turn things to their best uses, that any of us should think of pouring impurities of any kind into the glorious ocean, which is of itself the purest and most beautiful thing in creation.

There is one other circumstance which in conclusion I will mention, that may possibly account for the change of habitat, if not for the disappearance, of some of our delicate filamentous species; and this circumstance, I may observe, occupied many a conversation between my late friend Dr. Cocks and myself as long ago as the year 1858. For several years previously my friend had remarked a gradual advance towards low-water mark of some of the *Fuci*, and almost a corresponding encroachment on the shore of several of the *Laminariæ*, the usual place of growth of the latter being in deep water. These facts had been observed by me at Hastings and Brighton, and much later, on the coast of Northumberland, and still more recently at Exmouth, and up the coast towards Budleigh Salterton, and finally here in Torquay. How far these singular changes of habitat among the coarser species may have interfered with the growth of some of the delicate filamentous algæ, whose ordinary places of growth are between the tidal limits, it may perhaps be difficult to ascertain. My own professional occupations admit but of very brief visits to the shore, and I regret to say that, during the last ten years, death has sadly thinned the ranks of scientific algologists; and thus I have now few opportunities of comparing notes, even by

correspondence, on such phenomena as may come under my own notice and that of my friends, connected with the growth and economy of our British Marine Algæ.

A CHAPTER ON BARNACLES.

THE common Barnacle (*Lepas anatifera*, or perhaps *Hillii*), the soft part of which has so often been mistaken for a little bird, giving rise to the strange stories we have been considering, was long a puzzle to zoologists, who differed very much as to its exact place in the animal kingdom. Linnæus considered it a multivalve mollusk; but after a great many changes of position Mr. Thompson fully established its claim to be classed with the Crustacea, a sub-class of which, the Cirripedia, embraces all the known Barnacles, widely differing as they do in external appearance. The sub-class Cirripedia is divided into three families,—the Lepadidæ, or pedunculated Cirripedes; the Verrucidæ, or Verrucas, containing only a single genus; and the Balanidæ, or sessile Cirripedes. In the first stages of their

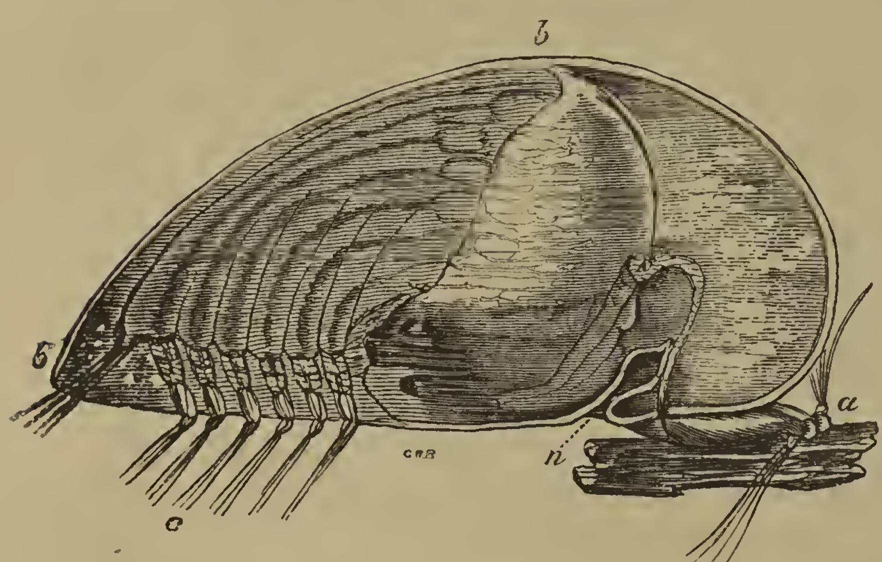

Fig. 119. Larva of *Lepas australis*, in last stage of development, greatly enlarged, from Darwin's monograph of the Cirripedia: *a*, antennæ with sucking disks; *b*, carapace; *c*, natatory legs; *n*, apodemes supporting eyes.

separate existence, the larvæ of the whole of this group are free-swimming and furnished with pedunculated eyes. In its last or third stage of development (fig. 119), the larva is covered with a shell or carapace (*b*), and furnished with six pairs of natatory legs (*c*); also a pair of antennæ (*a*), on each of which is placed a sucking disk, by means of which the pupa attaches itself; there are also two large compound eyes (*n*). The final change is thus described by Mr. Darwin. The pupa attaches itself to the object which is to form its home by means of the two disks, it then moults the shell or carapace, together with the eyes, next the integuments of the thorax and the swimming-legs; the antennæ are not moulted, but left cemented to the surface of attachment, their muscles converted into sinewy fibres; the corium after a short time is absorbed, and they are then preserved in a functionless condition at the base of the peduncle; the young cirripede assuming its natural position, as shown at fig. 120. The whole transformation is

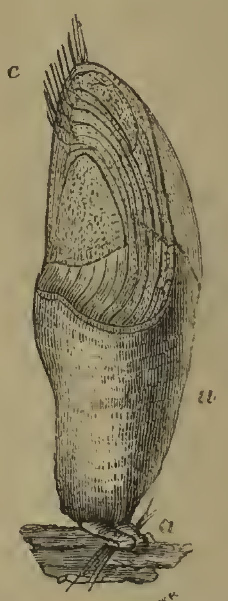

Fig. 120. Young Cirripide (enlarged), immediately after moulting the pupal carapace and assuming its natural position: *a*, antennæ; *c*, natatory legs (not yet moulted, but functionless); *n*, the peduncles. From Darwin.

very curious, and can best be explained by reference to the accompanying figures, 119 and 120, copied from Darwin's monograph of the Cirripedia. From the specimens figured it will be seen what a vast difference there may be in the external appearance of the different individuals of a group of animals between which there exists the closest homological agreement.

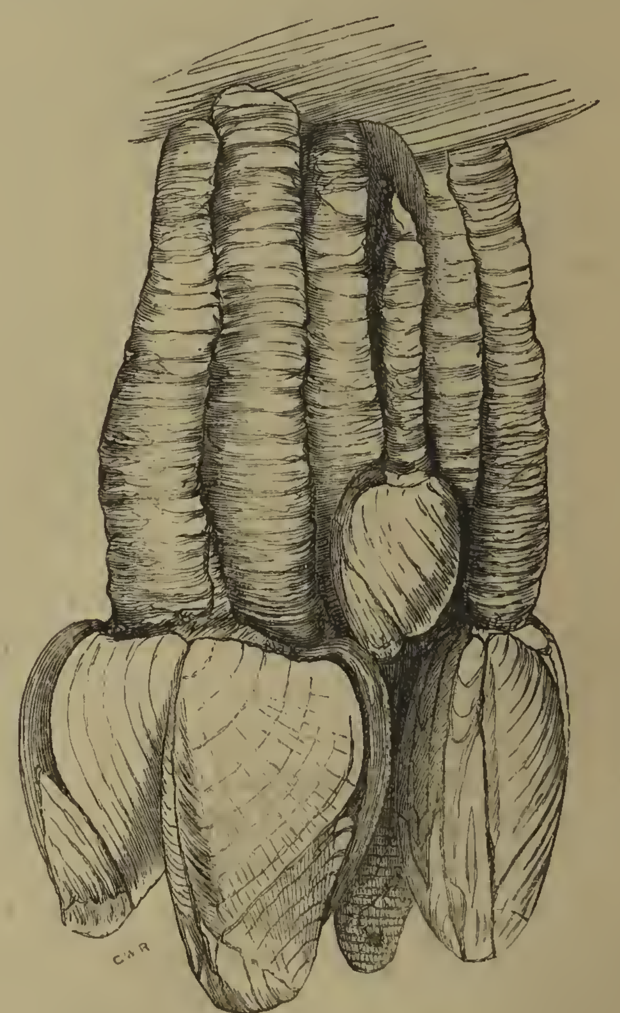

Fig. 121. *Lepas anatifera*.

The species of pedunculated Cirriped best known on our coast is the *Lepas anatifera*,

but I think it probable a closely allied species, *L. Hillii*, often occurs, without being recognized as distinct. Both these species have the same habitat, being found, sometimes associated, attached to floating objects, ships' bottoms, &c., and have a very wide geographical range. The beautiful cluster of *Lepas anatifera*, fig. 121, was found

Fig. 122. *Conchoderma aurita*, nat. size (Darwin).

Fig. 123. *Conchoderma virgata*, × 2 (Darwin).

attached to a piece of drift timber on the Cromer coast. The *Conchoderma*, of which we have two species, *C. aurita* (fig. 122) and *C. virgata* (fig. 123),

Fig. 124. *Scalpellum vulgare*, × 3 (Darwin).

are found all over the world attached to ships' bottoms, whales, &c., and are very common; certainly they are queer-looking objects. A member of another genus, *Scalpellum vulgare* (fig. 124), is found attached to corallines upon the British coast in water from 20 to 50 fathoms deep, also in Norway, France, and at Naples: it is a very remarkable one. The Cirripedia generally are bi-sexual, but there are four genera, of which *Scalpellum* forms one, remarkable for the sexes being either separate or the hermaphrodite aided by complemental males. The male, or complemental male, is parasitic upon the female, attached to different parts in different species. Mr. Darwin, to whom this interesting discovery is due, describes them as very minute, rudimentary to a degree, in fact,

Fig. 125. *Balanus porcatus.*

sometimes a mere bag of spermatzooa, destitute of mouth and stomach, and of course short-lived, the female being supplied with a fresh crop of males at the proper season. Sometimes several of these males are attached to the same female; in *S. vulgare* they are found, often several together, on the margin of the scutum, or large valve immediately over the orifice; in *S. ornatum* there are two males found, and the position they assume is one on the under side of each scutum in cavities formed for their reception. Mr. Darwin supposes the larvæ crawl in at the orifice (as the males are periodically replaced), scratch out the dead exuviæ of the former occupants, and there undergo their metamorphoses.

The sessile Cirripedes, or "Acorn-shells," are well represented on all parts oft he coast, attached to rocks, shells, &c. *Balanus porcatus* (fig. 125) is found on the coast of the British isles, and its habitat extends in a northern direction to Davis Straits and Lancaster Sound. It attaches itself to shells, crustacea, and sponges: the largest British specimen Mr. Darwin ever saw was 1·3 in. in basal diameter. Fossil specimens from the glacial deposits of the Isle of Bute have been obtained nearly 2 in. in diameter and 1·85 in. in height. Mr. Darwin remarks that specimens of this species as well as those of *B. crenatus* and *B. Hameri* (fig. 126), from northern localities and from the glacial deposits, often exceed in dimensions those of Great Britain and Ireland; he has seen a Scarborough specimen of *B. Hameri* 1·6-in. in diameter and 3 in. in height: the same species

from the glacial deposits of Uddevalla has been found nearly 4 inches in height. The handsome genus *Coronula*, of which there are three recent and one fossil species known, is remarkable not only for its beauty, but for the habitat chosen by its

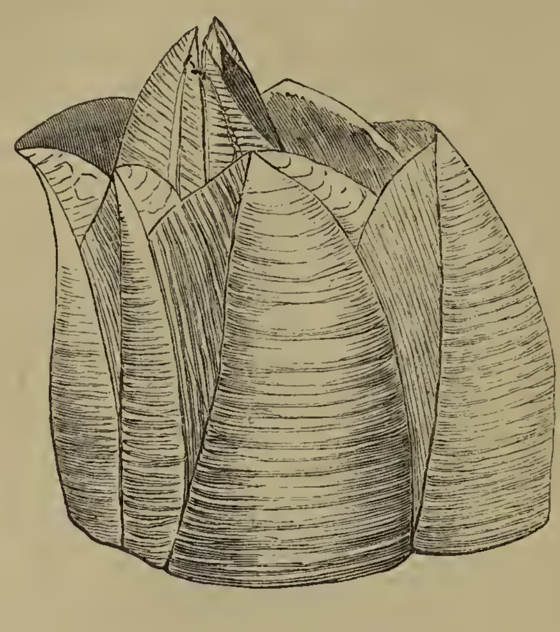

Fig. 126. *Balanus Hameri.*

members; they are found attached to the epidermis of the whale. *Coronula diadema* (fig. 127) is found on the whales inhabiting the northern seas. Sometimes it attains a very large size, and Mr. Darwin mentions one $2\frac{1}{2}$ in. in diameter and 2 in. high.

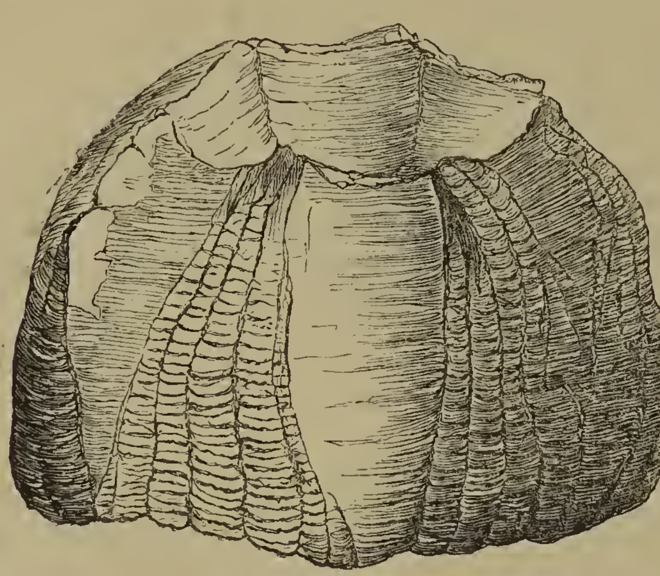

Fig. 127. *Coronula diadema.*

After wading through the mass of absurdities, of which I have given you, I fear, more than enough, it is perfectly refreshing to turn to the records of modern research, and follow Mr. Vaughan Thompson in his delicate and patient observations, by means of which he was enabled to trace the small translucent animal $\frac{1}{10}$ of an inch long, he found in his muslin towing-net, through changes which established the identity of the free-swimming stalk-eyed crustacean with the Balanus found attached to the rocks, stones, and shells of the sea-shore. With regard to the bird to which such a wonderful origin has been assigned, the Barnacle Goose, I need say, very little. It is a well-known winter migrant on the east coast; its summer home, where it breeds, being the high latitudes of Northern Europe: it is a very handsome species, and, being a vegetable-feeder, excellent eating,—a point, and almost the only one, regarding it on which we can agree with its early historians.

It will be observed that the learned author of the "English Physician" does not hesitate for a moment to admit that "the greatest part of insects and some other creatures, as frogs, &c., are spontaneously bred," although they "do afterwards couple and generate"; and even Ray, in his edition of Willoughby, published so late as 1678, though he denies to any *bird* an "equivocal or spontaneous generation," does not offer any objection to that theory with regard to "lesser and more imperfect" animals, such as frogs and insects. In the present day we have advanced a step farther, and repudiate the idea of even frogs and insects springing into life gendered of scum or putrefaction. It is evident, therefore, that the field still left for the exercise of this unconstitutional mode of coming into the world is small indeed, in fact no other than the field of the microscope. Judging from what has come before, is it not probable that when the minute organisms, so difficult to study, are better known, even this last scarcely tenable hold of the old superstition will be cleared away, and that the same law of nature which governs the increase of every organism with which we are *thoroughly* acquainted—like producing like—will be proved to pervade the whole universe; and as there is now nothing too *great*, so nothing will be found too *small* to be subject to it!

T. S.

THE WINFARTHING OAK.

THE discussion in the late numbers of this Magazine concerning the old trees of Britain induced me to pay a visit to my venerable neighbour the Winfarthing Oak, whom I had not seen for just a quarter of a century. The sketch that I took of him on that occasion bears date, I see, November 10th, 1848, and I am happy to report that on my recent visit (July 25th) he seemed to me fully as vigorous as then; one large arm being well clothed with leaf, and giving promise of fruit. Indeed, it struck me that his appearance had rather improved than otherwise. Now the age of this tree has been estimated by such authorities as Loudon and others to be 1,500 years. It is said to have been called the "old oak" at the time of the Conquest; and although the correctness of this assertion has not, I believe, been substantiated by any modern observer, it is pretty certain that it *was* an old oak, and a very old oak too, at that time, and the fact of its having been so called may rest upon its having served to mark some Saxon boundary.

But I wish to show how little impression the

hand of time, as measured in our butterfly lives, can make upon the tough old frame of such a veteran as this. In the year 1820 the circumference of the trunk in the middle was 40 feet, and on the 25th of July, 1873, it is exactly the same; showing either that he of the scythe and hour-glass has, for the last 53 years, given up his attacks upon him as a bad job, or that our old friend is tired of keeping his birthdays after the wont of trees, and of registering his age by an annual increase of his circumference.

So much for the past,—and now for future prospects. I beg, then, to recommend his life for assurance to any office whose directors are inclined to make a good stroke of business, for verily, as far as I can ascertain, his health has undergone no change for the worse during the present century, and we have some pretty strong evidence that he is as vigorous and well (or even more so) as he was about the year 1796, for in the *Gardener's Magazine* a correspondent, writing in 1836, says of this tree,—"Is is said to be very much altered of late; but I own I did not think so when I saw it about a month ago (May, 1836), and my acquaintance with the veteran is of more than forty years' standing,—an important portion of my life, but a mere span of his own." If this writer is to depended upon, the condition of the tree must have undergone a marvellous improvement between the date of his communication and the present time, for he further says:—"It is now a mere shell, a mighty ruin, bleached to a snowy white, but it is magnificent in its decay. The only mark of vitality it exhibits is on the south side, where a narrow strip of bark sends forth a few branches, which even now occasionally produce acorns." But this description by no means does justice to the oak at the present date, for although it may be called a shell and a mighty ruin, the snowy whiteness (which may have been attributable to some lichen which has now disappeared) is no longer observable, and instead of the narrow strip of bark and the few branches said then to constitute the only mark of vitality, a vigorous limb is now covered thickly with dense and healthy foliage and young fruit, and our Norfolk monarch may still be called in a green old age. Fourteen or fifteen persons might easily sit round a table in his interior.

In an adjoining meadow is another magnificent oak, which may with more propriety be called a ruin, for only a few branches give evidence of life. The circumference of this tree is 30 feet at 3 feet from the ground. It is far more favourably placed for observation than its more ancient neighbour.

In conclusion, let me express a hope that some gentleman, now peradventure in his swaddling-clothes, will take the trouble just fifty years hence (July, 1923) of visiting these venerable objects, and of reporting on their changes; by doing which he will greatly oblige—not exactly myself—but some future lover and reader of SCIENCE-GOSSIP.

Note.—Much interesting information concerning this and other ancient trees will be found in the Rev. C. A. John's "Forest Trees of Britain," and in the third volume of Loudon's "Arboretum et Fruticetum Britannicum," where two sketches of the Winfarthing Oak are given.

Diss, Norfolk. T. E. A.

RAMBLES AMONG THE MODERN VOLCANOES OF ITALY.

ALTHOUGH we know not for certain which of the various volcanic groups of the west of Italy came into action first,—whether those immediately north or south of Rome, those of the Phlegræan Fields, or Vesuvius,—yet, as regards their present aspect, while the volcanoes of the district round Rome have entirely ceased to show any signs of activity, and there are no historical records of any such, those of the Phlegræan Fields may in some cases be considered as still active—such as the Solfatara—and several eruptions are on record; while lastly, Vesuvius, after having been apparently long quiescent previous to the year A.D. 79, is now in a state of permanent and vigorous activity. So that, in noticing a few of the most marked phenomena of the modern volcanic rocks of western Italy, the proper plan will be to begin with the Roman volcanoes, thence pass to the Phlegræan Fields, and lastly touch briefly upon Vesuvius.

The Alban Hills may be taken as a good sample of volcanic action in the Roman area, and the Alban Mount forms a most excellent type of volcanoes in general.

Perhaps one of the most instructive ways of visiting this extinct volcano is to proceed by rail from Rome to Albano station, walk up the hill through the towns of Albano and Ariccia, and thence through the woods above one end of the Alban Lake to the summit, returning through the crater to Rocca di Papa, and across to Frascati, where rail may again be taken into Rome.

Starting then from Albano station, a good section of a lava-current is soon met with where the high road crosses a small stream. This old lava is a somewhat fine-grained greenish-grey basalt, with scattered crystals of green augite. As the road is ascended, beds of ash are seen of somewhat varying consistency and degrees of fineness, some layers being evidently currents of liquid ashy mud, and exhibiting sometimes apparent instances of false bedding, while upon them, or dovetailing into them, are layers of coarser material, approaching even to a breccia. Such sections are met with in the roadside cuttings before reaching the town

of Albano. Along this part of the road the traveller is struck by the view on his right hand, for beneath him stretches a richly-cultivated plain, hemmed in on all sides but the south-western by hills, and exhibiting unmistakable marks of the site of an old lake: it is in fact an old crater-lake eight miles in circumference, the crater of some long extinct volcano converted first into a lake (which it seems not unlikely was its condition in the days of Strabo), and then, being drained, into a most fertile plain: this is backed by the picturesque town of Ariccia with its handsome viaduct forming connection with Albano.

Passing through Albano, the site of the villas of Pompey and Domitian, an interesting section presents itself just before crossing the viaduct; here a very coarse and loose ash overlies a fine and compact muddy ash, and in the former are many fragments of white crystalline limestone, fragments which must have been torn from some of the limestone rocks through which the volcanic vent was opened, and have fallen with the various fragments of lava, pumice, and fine powder, round—though at some distance, probably, from—that vent. From the viaduct itself a beautiful view is obtained: on the one hand up a well-wooded vale, with the Alban Mount towering in the background; and on the other, over the old crater-lake of Ariccia to a belt of flat campagna, and the blue Mediterranean beyond.

From Ariccia the shortest way to the summit of the mountain is through the beautiful woods clothing its sides, along tracks worn in the soft white crumbling ash, into which stream-courses have deeply cut, and which forms a soil of light powder, with innumerable sparkles of mica-flakes and augite crystals. Before the summit is gained some beautiful glimpses of the Alban Lake are obtained through the surrounding wood; a lovely basin of water six miles in circumference, closely surrounded by the old crater cliffs, for this too is an old crater, upon the edge of which is happily placed the village of Castel Gandolfo 460 ft. above the level of the lake. Monte Cavo, as the summit of the Alban Mount is called, is 3,130 ft. above the level of the sea, and forms the highest point of the circular crater of the old volcano. The view from it is exquisite; the crater-lakes of Albano and Nemi; picturesque villages aptly perched upon rocky prominences or swelling hills; the old crater-walls, and the far older crater-walls beyond them; the snowy Apennines; the flat Campagna, where imperial Rome still sits defiant; the old volcanic hills and crater-lakes (Bracciano, &c.) beyond; the blue waters of the Mediterranean;—all go to make up a panoramic picture of surpassing and peculiar beauty.

Standing then on the summit of Monte Cavo one sees at one's feet a capital type of a normal volcano; most evident are the crater-walls, perfect on all sides except towards Rocca di Papa, and inclosing a circular plain, where, according to tradition, Hannibal encamped when marching against Rome. In the centre of this plain rises a small but well-formed cone, while far beyond the crater-walls, but rudely parallel to them, is a line of hills marking the boundary of a much older and larger crater, a giant in its time.

Descending the crater-walls on their inner side, many sections may be examined which reveal their structure, and show them to be made up almost wholly of beds of ash and scoriæ conglomerate, dipping outward, the result of ejection from, and falling round, a central orifice. Some of the ash, for the most part white, is very finely laminated, caused by its mixture with water and consequent muddy character; such beds, however, alternate with others of very loose scoriæ, resembling heaps of clinkers. On the side of Rocca di Papa—one of those happily-placed mountain villages, the site, moreover, of the ancient Fabia—where the crater-wall is broken down, there have issued two streams of leucitic lava, one of which flowed nearly as far as the present site of Rome, the other south-westward to Ardea. An excellent section of one of these lava-flows is seen in the bold rocky cliff immediately below which the village is built. It is a dark grey rock, formed of augite and leucite, the leucite crystals being conspicuous, and rests upon a bed of fine yellow and black ash some 20 ft. thick, dipping away from the crater in a north-west direction, at an angle of 26°.

At several points on descending through Rocca di Papa the beds may be seen with the same high outward dip, and even as far as Frascati their general inclination is markedly away from the central crater of Monte Cavo. In places, however, these ash and ash-mud beds have been disturbed and thrown into gentle curves. In a cutting at Frascati station is a coarse volcanic breccia, many of the blocks being of considerable size.

The points then specially to be noted from such a brief examination of this ancient volcano are:—

1. Its typical structure,—two craters, an old and a more modern, and a central cone; the crater-walls and the modern cone all formed, in the main, of outwardly-dipping beds.

2. The small proportion of lava-currents as compared with the great bulk of ejected materials, that seem to form the mass of the mountain.

3. The ejected materials have a wide spread, and consist of what must have been liquid ash-mud, and loose dry ash and scoriæ.

4. The many old crater-lakes around seem to have been all more or less connected with the principal volcanic mountain, Monte Cavo.

J. Clifton Ward.

THE GOAT-MOTH.

IT is not surprising that the name of this most interesting insect should have figured rather frequently of late in the pages of SCIENCE-GOSSIP, for it stands out very prominently from the ranks of British lepidoptera. Not only peculiar in its own habits and physical characteristics, it has, or is generally supposed to have, a well-authenticated antiquity, of which no other moth can boast. It is not, therefore, without something very like a pang that a classical entomologist can read articles like that by Mr. Spicer on page 130, tending to throw discredit on the generally received reports. It is so completely in accordance with the spirit of the age to question assumptions which rest on no strictly logical grounds, that we must always be prepared either to do battle for them or to cast them ruthlessly to the winds. With every desire to regulate my entomological creed according to the dictates of reason, I cannot help doubting whether in the present instance Mr. Spicer has made out any case. We have all learnt within the last few weeks that the surest way of showing that a claimant is not the individual he pretends to be, is to try and prove his identity with some one else. Mr. Spicer has made strenuous attempts to show that the Goat-moth has no right to the name *Cossus*, but he has failed to show what insect ought to be so called. His supposition that *C. ligniperda* does not feed upon the oak would be, if well founded, a weighty piece of evidence; but as a correspondent (p. 166) with charming *naïveté* remarks,—"Mr. Spicer says 'Pliny's cossus was also an oak-borer, which the goat-moth is not.' Certainly the *moth* may not be an oak-borer, but its larva most decidedly is." This statement is confirmed by Mr. Newman. I have not a copy of Pliny's works by me at the present moment, so that I cannot say whether he attributes the "parvulus stridor" to the larva or perfect insect. If he alludes to the former, his words are easily explained. It is only a few weeks ago that I noticed the squeaking sound produced by one of these larvæ in rubbing its horn-plated head against some hard substance. Mr. Spicer goes on to say that no civilized people, ancient or modern, would eat, as a delicacy, such a repulsive-looking creature as a cossus larva. This is rather a bold assertion, considering that oysters and other shell-fish, not to mention snails (*Helix pomatia*), rank among modern civilized delicacies, and are not always eaten in the in the most refined manner.

With respect to the Roman standard of taste, it would perhaps be not uninteresting to name some of the dishes which were held in the highest estimation. Peacocks, pheasants, guinea-fowl, nightingales, thrushes, ducks and geese, are in the list of birds; the Romans were also very fond of fish, and we are not much impressed with their civilized culture, when we learn that they were in the habit of weighing fish alive at table, and reckoned it a a piece of entertainment to see them expire. Oysters, snails, and many fruits, together with confectionery and made dishes, formed the less substantial portion of the meal. Larvæ of cossus properly cooked and prepared might well take place with the above-mentioned articles of food. No doubt the cossi eaten by the Romans were of the finest description; perhaps they may have been specially bred up for the table. At all events it is easy to understand that a larva taken from a willow-tree might have a pleasanter flavour than one which had been feeding in the trunk of an elm, or *vice versâ*. The curious thing is, that no English lepidopterist seems willing to test the matter for himself by eating a caterpillar prepared in the Roman fashion. I once made an arrangement with a brother naturalist by which he was to cook, and I to eat a cossus; but at the last moment his courage apparently failed him, and when I arrived, screwed up to the necessary pitch of valour, I found the cossus uncooked.

EDWARD C. LEFROY.

PECULIARITIES IN SITE AND STRUCTURE OF BIRDS' NESTS.

PECULIARITIES in the site or structure of a bird's nest, or in the habits of the birds themselves, generally excite an interest in the minds of those who delight in natural-history studies; and, judging from the numbers of instances yearly recorded in newspapers and periodicals, do so in most minds. Fond of natural history from boyhood, and especially of that of birds, I have made not a few notes on their habits and homes; and thinking that a few instances, chiefly relevant to the heading of this short paper, might interest others, and possibly elicit instances of a like nature from some, I record them.

Redstart (*Phœnicura ruticilla*).—I have found a nest of this species built on a shelf formed by a piece of deal nailed across the beams supporting the second floor of an outbuilding. The first floor was a cartshed, in one corner of which stood a grindstone, and immediately above that was the nest, which contained young ones, fledgelings. It was constructed of dead leaves, matting, shavings, dry grass, weeds, moss, hair, and feathers, being lined with the three last-named substances,—a miscellaneous accumulation, loosely put together.

Blue Tit (*Parus cæruleus*).—Observing one day a pair of blue titmice repeatedly disappear over the top of an inclosure for poultry, induced me to watch them; and having obtained a good position, I soon saw the object of these oft-repeated visits,—

a hole in the wall, containing their nest and young, for which they were catering so assiduously. The top of this walled inclosure was covered with wire netting, through the meshes of which the parent birds passed and repassed every time they visited their nest.

Hedge Accentor (*A. modularis*).—Once I found, in a small wood on the Otter Burn, North Northumberland, a nest of this species built on one of the lower branches of a fir near the trunk. It was constructed outwardly of fir, twigs and moss, and was lined profusely with white hairs. It was a pretty sight, the beautiful blue eggs lying in the wholly white cup-shaped hollow, enhanced by the mellowed light of high noon as it pierced the dense foliage of the tree.

Blackbird (*Turdus merula*).—This nest, if such it might be called, as it consisted merely of a little coarse grass and a few dead ferns and leaves, forming a platform just sufficient to keep together the three eggs it contained, was built on an exposed branch of a shrub overhanging a stream. Out of many scores of nests of this species that I have seen, this was the only one without a plastering of some sort. Occasionally I have found the nest of the Blackbird on the bare ground; once on a rocky shelf; and at another time in a cavity on the side of a dene,—just such a site as a redbreast might have chosen.

Many writers on birds have recorded the pugnacity and courage of the Missel-thrush (*Turdus viscivorus*) during the breeding season; how pugnaciously it assaults other birds in its vicinity, and how courageously it drives away predaceous birds from its nest, showing a bold front even to human intruders. A lady correspondent, in July No. of Gossip, adds another interesting instance of the last-mentioned. I have seen its courage exhibited once only. This solitary instance was, however, for intensity, beyond what might be expected. Three of us lads were one day nesting in a wood, and in our searching had become separated, when I heard one call out. This companion had climbed a large tree, on a fork of which he was lying at full length, with a missel-thrush's nest a little in advance of him, whilst one of the birds, loudly screaming, was dashing close past his head, which he was protecting as best he could. Having climbed the tree, our other companion reaching me a stick, I attempted to strike the bird as it made its sallies down through an open space among the tree-tops, and it was not until several such attempts had been made that it was driven off. There were four eggs in the nest, only slightly incubated, two of them being mis-shapen. I have since thought that the ferocity of this individual, presuming it to be the female, might possibly be owing to an unhealthy condition, indicated by the mis-shapen eggs. At all events, of many other nests disturbed, in some of which the incubation of the eggs was considerably further advanced, there never was the least indication of pugnacity, the dam silently leaving the nest, either before the tree was reached, or the nest gained.

C. Robson.

Newcastle-upon-Tyne.

"PICK-CHEESES" AND "FAIRY-LOAVES."

It is seldom that we find geological specimens associated with folk-lore, or even possessing popular names. In this respect they are totally unlike plants, all of which have names and synonyms

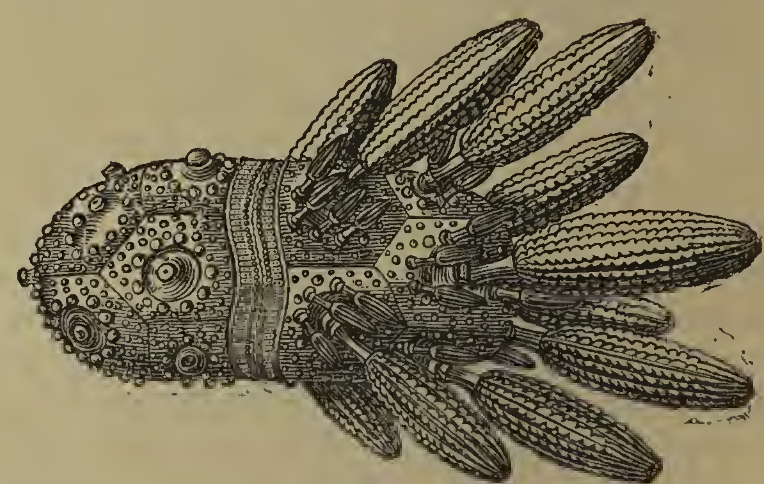

Fig. 128. Fossil cidaris (*C. coronata*), showing spines attached.

sufficient and to spare. The word "fossil" is made to comprehend all kinds of geological objects, and

Fig. 129. Ditto, showing naked test.

perhaps those distinguished by special names could be included in a score.

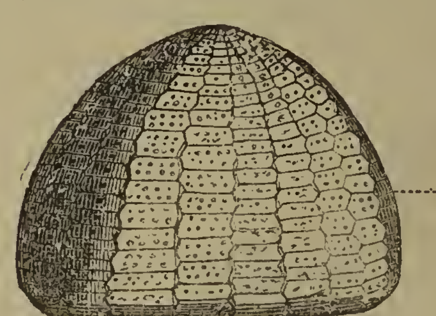

Fig. 130. "Fairy-loaf," *Ananchytes ovata.*

Fig. 131. Base of ditto, showing mouth and anus.

In Norfolk we have found more popular names applied to fossils than in any other county in England.

Even Derbyshire, with all its wealth of organic remains imbedded in its mountain limestone, is singularly free from popular names applied to the fossils—"Screw-stones," perhaps, being the only word. "Pick-cheeses," in Norfolk, is the term applied to the fruit of the common mallow, and as the internal flint casts of Cidarids greatly resemble these fruits, the name has been transferred to them by the quarrymen. Of all the thousands of species of fossils known to occur in our British rocks, there are few so ornamental in their character as the Cidarids (fig. 128). When denuded of their spines, you see rows of knobs running down the truncated globe, as in fig. 129. When the creature was alive, these knobs fitted into depressions in the bases of spines, on the principle of a ball-and-socket, or "universal" joint. The Cidarids are a very old race, and not many days ago we knocked a fine example out of the carboniferous limestone near Corwen, with two of the spines attached. Ever since the

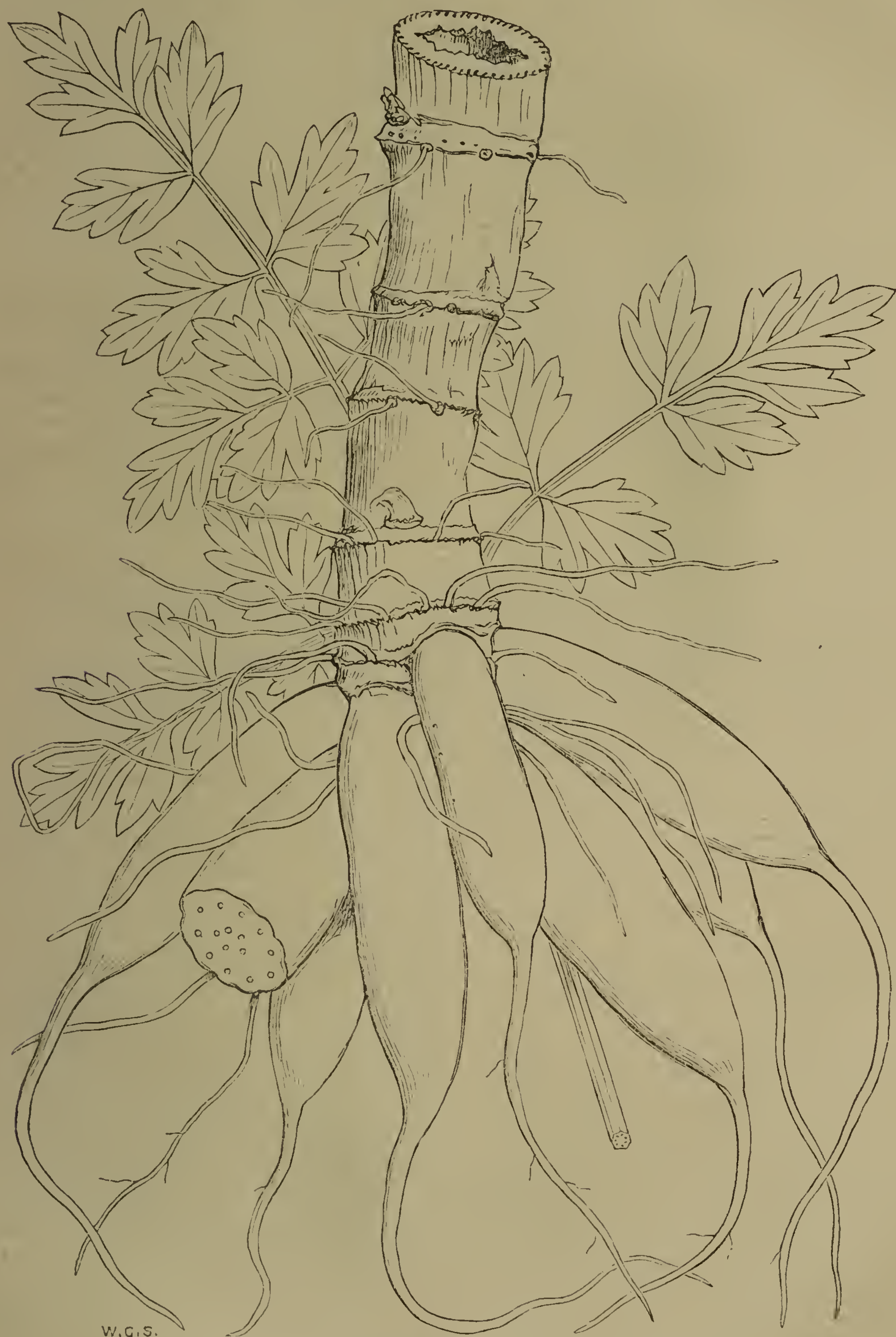

Fig. 132. Tubers of Hemlock Water Dropwort (*Œnanthe rocata*).

above period they have been in continuous existence, and are still far from uncommon in existing seas. What is more, the original principle of a ball-and-socket attachment of spines has never been departed from. The denuded surfaces are singularly alike in many species, there being the greatest play of variety in the shapes and ornamentation of the spines. A species still living in the Bosphorus is very like fig. 130, from the Oolite. And in our own seas, farther north, a species known by fishermen as the "Piper" (*Cidaris papillata*) hardly departs, either in its shape, size, mechanical construction, or ornamentation, from certain species formed in the secondary rocks.

"Fairy-loaves" are the common terms applied in Norfolk to those fossil echinoderms found so abundantly in the Chalk (fig. 131). Their surfaces are smooth, the five rows of ambulacral perforations being very distinct. The base, especially, shows the numerous minute granulations which served for the attachment of needle-like spines similar to those which still cover the common sea urchin. Not unfrequently the *internal* flint casts of this species are met with, and then the ambulacral pores stand out in relief, the old carbonate of lime test having been dissolved away. We often meet with these fossils covered with the coiled tubes of *Serpula*, with the valves of *Crania*, or young oysters; and these facts are not without importance in illustrating the slowness with which our chalk was originally deposited. For these "fairy-loaves" must have lain on the sea-bed after death, and their spines have been peeled off before the others could attach themselves to the naked test. And then the latter had time to live and grow, often to full size, before the chalk had accumulated so as to cover them up. J. E. TAYLOR.

THE WATER DROPWORT.

(*Œnanthe crocata.*)

THE various accidents which have occurred from time to time through the accidental and ignorant use of this plant, induce us to give an illustration of the tubers. The death of the children at Chester was undoubtedly due to their having eaten of the Hemlock Water Dropwort. Dr. Masters communicated with the surgeon who attended them, and from him obtained some specimens for examination, so that there can be no doubt as to the cause of their death.

The Hemlock Water Dropwort (*Œnanthe crocata*) is the most poisonous member of the genus to which it belongs. It is not uncommonly distributed throughout England, in wet places, although it is rarer in Scotland. Its general appearance greatly resembles that of celery, and hence, perhaps, the reason why it is so frequently eaten. Even cattle seem liable to mistake it, notwithstanding their instinctive appreciation of what is good for food; and in our "Notes and Queries" column will be found an account of the death of seventy-four oxen on the estate of Lord Dunraven, at Adare, co. Limerick, from having eaten this plant. Its very scent is said to produce a degree of giddiness. When it has been partaken of (and it is stated to be not unpleasant eating), the best plan of neutralizing its poisonous effects is to administer a strong and speedy emetic. So violent is the action of the Hemlock Water Dropwort on the nervous system, that its victims have been known to become affected with lock-jaw. It may be applied with safety externally, and it is so used in Westmoreland for the ulcers which occasionally form in the hoofs of cattle. The usual mistakes in connection with the Water Dropwort seem to be caused through mistaking it for celery. But even celery, in the wild state, if not absolutely poisonous, has a disagreeable effect. It is only when its habits are changed, and it is earthed up so as to bleach its base, and thus to prevent the green poisonous matter from forming, that celery becomes really edible. J. E. T.

MICROSCOPY.

QUEKETT MICROSCOPICAL CLUB.—The eighth annual meeting of this society was held at University College, July 25th; Dr. R. Braithwaite, F.L.S., president, in the chair. The report presented by the committee showed the present number of members to be 570, that the meetings of the year had been well attended, that considerable additions had been made to the library and cabinet, and that the slides in the latter had been entirely re-arranged and catalogued. The field excursions had been successfully carried on during the season, and the annual soirée was largely attended. Special mention was made of the continued kindness and liberality of the Council of University College, in permitting the fortnightly meetings of the club to be held in that building. The eport also stated that it had been decided to discontinue the journal of the club in its quarterly form, but that a proposal for the issue of monthly proceedings was under discussion by the committee. The treasurer's annual statement of account was also read to the meeting, and showed a balance in hand of £98. 19s. 5d. (subject, however, it was understood, to a considerable amount of unstated, but outstanding liabilities). The retirement of the hon. secretary, Mr. T. C. White, gave occasion for many expressions of mutual regret. The president read his annual address, in which, after congratulating the members upon the continued prosperity of the club he gave a resumé of the chief microscopical work of the year. Votes of thanks to the president,

secretary, and officers of the club, were unanimously carried, and the president, amidst much cheering, presented a testimonial, consisting of a valuable diamond ring, to Mr. T. C. White, on his retirement from the position of hon. secretary, which he had so ably occupied during the past four years. The result of the ballot for the election of officers for the ensuing year was as follows:—President, Dr. R. Braithwaite; vice-presidents, Messrs. T. W. Burr, B. T. Lowne, Dr. Matthews, and C. F. White; to fill vacancies on committee, Messrs. Bywater, Crisp, Hailes, Hind, Waller, and White; treasurer, Mr. Hardwicke; hon. secretary, Mr. J. E. Ingpen; hon. secretary for foreign correspondence, Mr. M. C. Cooke; assistant secretary, Mr. E. Marks.

Crystals of the Willow.—In answer to "C. E. B.," Salicine is obtained, according to Thompson's "Dictionary of Chemistry," in the following manner; viz. by boiling willow bark with water, precipitating the decoction by acetate of lead, diffusing the precipitate after washing through water, and decomposing it by a current of sulphohydric gas, filtering, evaporating, and crystallizing out the salicine. As the above is a process which none but a chemist will be likely to carry out with any degree of success, and as salicine is a common article of commerce, your correspondent had better purchase a few pennyworths of any druggist: he will find it is soluble in cold, but more soluble in hot water. It is soluble also in alcohol.—*Alfred Allen, Felstead.*

Microscopical Science.—The *Monthly Microscopical Journal* for August opens with a capital paper by Mr. W. H. Dallinger and Dr. Drysdale, entitled "Researches on the Life History of a Cercomonad: a lesson in Biogenesis,"—in which they describe the life history of a new Cercomonad, which is thus summarized:—"When mature, it multiplies by fission for a period extending over from two to eight days. It then becomes peculiarly amœboid; two individuals coalesce, slowly increase in size, and become a tightly distended cyst. The cyst bursts, and incalculable hosts of immeasurably small sporules are poured out, as if in a viscid fluid, and densely packed; these are scattered, slowly enlarge, acquire flagella, become active, attain rapidly the parent form, and once more increase by fission." They show also that the granules can withstand a temperature much higher than can the mature forms. Dr. Dawson remarks on Mr. Carruthers' views of Protataxites, the latter author having described it as a gigantic seaweed, called by him *Nematophycus*. Dr. Dawson gives further reasons for maintaining his original opinion that it is phænogamous.—Prof. Rupert Jones continues his papers on ancient water-fleas of the Ostracodous and Phyllopodous tribes (*Bivalve Entomostraca*). The Wenham-Toller controversy is maintained by Mr. Jabez Hogg and others, and there are abstracts of several papers, with notices of vol. iii. of Stricker's Histological Manual and Dr. Frey's celebrated work on the Microscope.

Crystals of Willow.—"C. E. B." may obtain crystals of salicine as follows:—Cut dry or fresh willow bark into small pieces, and boil in water. Concentrate the decoction, and whilst boiling add litharge until the liquid appears colourless. Remove the lead held in solution, first by sulphuric acid, and afterwards by sulphuret of barium. When the solution is freed from the lead, evaporate it; purify by repeated solution and evaporation. A second and easier plan would be for "C. E. B." to purchase a small quantity ready prepared. It is kept by most chemists, or it could easily be obtained in London. Salicine does not (at least so far as I know) occur naturally in willow bark, as "C. E. B." seems to imagine.—*K.*

ZOOLOGY.

"Feræ Naturæ of the British Isles."—This is the title of a capital *brochure* published by Messrs. William Blackwood & Sons. The author, Mr. John Colquhoun, is well known as a writer on sporting matters, and therefore his remarks are worth the attention of naturalists, as consisting chiefly of personal observations and experiences. The pamphlet is well written, and printed in clear, bold type, so that it reads smoothly and agreeably. Many of the observations are original, and throw light on contested questions in natural history.

"The British Bee Journal" is the title of a new serial which has recently made its appearance, under the conductorship of Mr. C. Nash Abbott. It is a capitally edited and well printed journal, and we cordially recommend it to all bee-keepers.

Norfolk and Norwich Naturalists' Society.—The neat annual volume of the Transactions of this Society has just appeared, and, as usual, shows that the members are engaged in good sound work. Although the society has only been in existence a few years, the ardour with which the members have worked the natural history of their county has placed it in the front rank of provincial societies. The present volume comprehends the address by the president, Dr. Beverley; a capital paper on the "Ornithology of Spain" (somewhat out of place in *local* transactions), by Mr. Howard Saunders, F.Z.S.; a short paper on the "Camberwell Beauty," by the well-known entomologist Mr. C. G. Barrett; and an elaborate article by Mr. Henry Stevenson, F.L.S., the author of the "Birds of Norfolk," on the "Wild Birds' Protection Act of 1872." There is also a first-rate paper by Mr.

Thomas Southwell, F.Z.S., on "The Otter," which is locally and generally valuable on account of the research exhibited in collecting everything relating to the former breeding and distribution of this animal, especially in Norfolk. The principal paper, however, and one which exhibits most long-continued work, is that by Mr. C. B. Plowright, M.R.C.S., on the "Fungi of Norfolk," which contains a full list of all the species hitherto found, each authenticated by a competent observer. Another paper, by Dr. Beverley, "On the Edible Fungi found in Norfolk," is also valuable. In addition to the above papers, the volume contains a series of zoological notes, furnished chiefly by Messrs. Stevenson and Southwell, relating to local matters. Altogether, therefore, it will be seen we have only done justice to a hard-working society by calling public attention to the nature of the work done in 1872-73.

Zonites glaber.—Your correspondent "E. H." in last month's Gossip, answering another correspondent, "A. P.," of the previous month in reference to the discovery of *Zonites glaber* as a British shell, says that it was first discovered by Mr. Miller in 1822, who described and published the same in his "List of Shells about Bristol." If "E. H." will look over the said list as published in 1822, I think he will find that he is mistaken. I inclose Mr. Gwyn Jeffreys' account as published in the *Annals and Magazine of Natural History* for May, 1870. I may say that the *Zonites glaber* is by no means rare, and probably may be found in every county in England and Wales (as it is already known to be in eight or nine), the most northern of which is Westmoreland, and the most southern the Channel Isles.—*T. R.*

Zonites glaber: a new British Land-shell.—My correspondent, Mr. Thomas Rogers, of Manchester, has added another species to this well-worked department of our fauna. Specimens of a *Zonites* which he has now sent me, collected by him under stones at Marple Wood, in Cheshire, prove to be the *Helix glabra* of Studor, Fér. Prodr., No. 215. *Z. glaber* has a wide range on the Continent, from Normandy (where I have taken it), through France, Savoy, Switzerland, Germany, and Dalmatia, to Epirus in Greece. I also found the same species in 1846 at Grassmere, and in 1857 at Barmouth, but had overlooked it. Mr. Rogers's specimens being alive, I subjoin a description of the animal. Body dark bluish-grey, striped like a zebra on each side in front, and irregularly mottled behind; in one of the specimens the hinder part of the foot is minutely speckled with yellowish-brown dots; two narrow and slight parallel grooves run along the neck from the head to the upper lip of the shell; the surface is more or less wrinkled, and has a few large but indistinct lozenge-shaped markings; *mantle* very thick and dark at the mouth of the shell, over which its edges are folded; *tentacles*, upper pair rather long, and finely granulated; lower pair very short; *eyes* small, placed on the upper part, but not at the tips, of the tentacular bulbs; *respiratory orifice* round, occupying the centre of the pallial fold; *foot* very long and slender,—the sole appears as if separated from the upper part of the foot, being defined by a darker line; *slime* thin and nearly transparent. I could not detect any smell of garlic (so peculiar to *Z. alliarius*), although I frequently irritated the animals. The shell is three times the size of that of its nearest congener, *Z. alliarius*, and is of a reddish-brown or waxy colour; the whorls are more convex or swollen, the lower part of the shell is not so much arched, the mouth is larger, the umbilicus is smaller and narrower, and the colour underneath is sometimes whitish.—*J. Gwyn Jeffreys, in Annals of Nat. Hist., May,* 1870.

How do Parasitic Insects detect their Prey?—A variety of opinions have been expressed as to the means by which ichneumon flies, and other parasitic insects, discover the living objects upon which they seek to deposit their eggs. Some have inferred that this is done by sight, others by smell, or by the operation of some peculiar sense unknown to us. The rapid movements of some of the Hymenopterous parasites which attack caterpillars would rather lead one to suppose that the sense of touch is an agent, if not the sole agent. These flies may be noticed running rapidly up and down leaves and twigs, with vibrating antennæ and palpi, sometimes going over very nearly the same ground again and again, which they would hardly do if they chiefly depended upon their eyes; and were any odour given forth which led them to their victims, these flies would hardly wander about in the manner we see. It is quite possible they may detect even the larva of Tortrices by the feel of the leaf enclosing these, though the larvæ themselves are screened.—*J. R. S. C.*

New British Hemiptera.—Mr. John Scott records the occurrence of an additional genus and species of British Hemiptera, in the August number of the *Entomologist's Magazine*, named *Loxops coccineus*. The specimen was taken at St. Albans, last year, by sweeping, by the Rev. J. A. Marshall. It occurs sparingly on the Continent, generally singly.

New Species of Cellepora.—Mr. Edward Parfitt describes in the *Annals and Magazine of Natural History* for August, a new species of *Cellepora* obtained by him at Exmouth, and to which he has given the name of *Cellepora hemisphærica*, from the cells forming little hemispherical masses.

It appears to be perfectly distinct from any other form, either recent or fossil.

Retardation of Insect Development in 1873.—Many species of the Lepidopterous order have not only suffered notable diminution, but have had their appearance greatly delayed by the unsettled weather which has been pretty general in Britain during the spring and summer. The delay is easily explainable in some cases, as owing to the check given to the growth of the food-plants, larval life is prolonged; in others, the prolongation of the egg and chrysalis states, is caused by low temperatures, especially at night. Some species, moths chiefly, are naturally capricious, even though there may be but one annual brood; thus one is not surprised to see imagos of *O. psi*, or *O. betularia*, at any time from the middle of May to August. Why certain species, as for instance *O. potatoria*, should be behindhand is not so evident. The larva of this moth is little affected by the weather, and all grasses have grown in profusion this year, so that there has been no lack of food. Yet some were about the first fortnight of this month (July), just when the moth would be looked for.—*J. R. S. C.*

Abundance of C. Cardui in Kent.—Many hybernated individuals of this butterfly were on the wing in the vicinity of Gravesend throughout July, and even at the beginning of August, leading to the conclusion that the species must have been late in emerging from its winter quarters. It may probably happen with this as with *V. atalanta*, that specimens of the old and new broods are met together occasionally. The persistency with which the "Painted Ladies" will return to a spot where they have been resting, should they have been startled from it, has been insisted upon by a cynical friend as a clear proof of the appropriateness of the feminine designation. However battered these butterflies may be, they rarely lose their power of rapid flight, not even when they have attained the venerable age of about ten months.—*J. R. S. C.*

BOTANY.

Rare Plants.—I have great pleasure in informing you that on the 4th August I found *Stachys annua*, in some considerable quantity, on some hills near Sevenoaks, in Kent, in a situation which could not have ever been tilled, and also *Ajuga chamæpitys* in profusion.—*James Fletcher.*

Double Flowers and Perfumes (p. 163).—The double rocket, pink, carnation, saponaria, rose, hyacinth, are all sweet-scented; the double wallflower, although so closely allied to the stock, loses its fragrance. Ray mentions a variety of *Hydrocharis* with double sweet-scented flowers, but the colour is faintly perceptible in the usual form of the plant.—*R. A. Pryor.*

Variation of Colour in Flowers (p. 161).—Neither the daisy or the wood anemone are, strictly speaking, "white flowers;" the ligulate florets of the former are more often tipped with crimson than not, while the sepals of the latter are almost invariably flushed with a more or less delicate purple, sometimes, indeed, quite deep in tint, and in an instance from, I think, Harrow, recorded in the "Flora of Middlesex," approaching to crimson. Not only is the common Milkwort extremely variable in colour, but the rare *Polygala austriaca*, whose normal hue is, in German specimens at least, invariably white ("*flores semper albi*," says Reubenbach), is of a dull blue in both its English localities. The white hawthorn changes to red, the white and pink brambles are almost equally common, and the white water-lily has been found wild of a beautiful rose-colour in one locality in Sweden. As to the lily of the valley, Mr. Robinson, in his interesting work on alpine plants, has enumerated, in addition to the form discussed in your columns, varieties with double flowers, both white and rose-coloured, besides others with leaves margined with silver or striped with yellow.—*R. A. Pryor.*

Cineraria campestris.—Mr. G. S. Streatfeild records the occurrence of this plant, in the August number of the *Journal of Botany*, as being found at Ancaster, Lincolnshire. This locality extends its north-eastern range, Cambridgeshire being the highest point recorded on this side of England.

Grass Gum-tree.—*Nature* states that *Xanthorrhœa australis*, one of the grass gum-trees of Australia, is coming into flower for the first time in Europe, in the Succulent-house at Kew. There is also a fine plant of *Agáve jacquiniana*, removed to the Palm-house for the sake of space, which is now in full flower.

Verification of Lists.—The Brighton and Sussex Natural History Society have issued circulars for the purpose of collecting facts in connection with the Natural History of Sussex, for the purpose of verifying existing lists, and preparing, with a view to ultimate publication, an authentic and systematic record of the land and marine fauna and flora of the county. We cordially wish them success in their praiseworthy undertaking.

GEOLOGY.

Scottish Bone-Caverns.—It has long been known to geologists that the western and southern coast-line of Scotland is pierced with caves at different levels, indicating former successive levels at

which the sea waves worked. Unfortunately, owing to the want of limestone or very calcareous rocks, these caves, as a rule, present none of that stalagmite deposit which has elsewhere served so abundantly to cover over and preserve the remains of the ancient denizens of our country with traces of the presence of man himself. The caves usually open directly upon the coast, with free exposure to the air, so that their floors show nothing but damp boulders and pools of water from the drip of the roof. Recently, however, a remarkable exception to these ordinary conditions has been observed on the wild cliff line to the south-west of the bay of Kirkcudbright; the Silurian strata are there traversed with strings and veins of calcite along lines of joint and fracture, and at one point where an old sea cave occurs, the walls and floor at the cave mouth, and for a few yards inwards, have a coating of solid calcareous matter. Beneath this coating in the substance of the breccia, which extends across the cave mouth, as well as throughout the cave earth behind the breccia, a great quantity of bones, with traces of human occupation, has been found. A systematic investigation of the cave, commenced last autumn, is being carried on under the direction of Mr. A. J. Corrie and Mr. W. Bruce-Clark, the discoverers of the osseous layer. At the present time the following, among other remains, have been noted: bones of ox, red-deer, goat, horse, pig, pine-martin, rabbit, water-mole, and other small rodents, together with numerous remains of birds, and a few frog and fish bones. Intermingled with these occur fragments of bronze, bone needles, and other bone implements, to the number of more than twenty. One piece of worked stone (a fragment of greywacke) has been found, but as yet not a single chip of flint. A full account of the cave will be published as soon as the investigations are completed.

"Coal and Coal Plants."—This is the title of one of the evening discourses of the British Association Meeting at Bradford, which commences on the 17th of September. The lecturer is Professor Williamson, who will occupy the Presidential chair in the place of Dr. Joule, who is obliged to resign the Presidency on account of ill health.

New Species of Stromatopora.—Professor H. Alleyne Nicholson has described four new species of *Stromatopora* from the Silurian and Devonian formations of Western Canada. The affinities of this singular genus have always been esteemed uncertain, though there has been a tendency to regard it as referable either to the foraminifera or to the sponges, or as constituting a connecting link between these two orders of Rhizopoda. From the structure of the above new species, Professor Nicholson thinks they show certain points of relationship to sponges, which have not been noticed in the species already recorded by palæontologists.

Evidence of Increased Cold in the Cromer Forest Bed.—In Sir Charles Lyell's new edition of the "Antiquity of Man," he says, "It occurred to Mr. Nathorst, a skilful Swedish geologist, who visited the Cromer section in the autumn of 1872, that the lignite beds of the laminated sands and clays ought to exhibit in their vegetable remains a transition from the comparatively mild climate of the Forest Bed to the severe cold indicated by the Till; and he was fortunate enough to find the remains of plants becoming more stunted as they occurred higher in the beds, until within half a foot of the boulder clay he found *Salix polaris*, now only known within the Arctic circle, together with a moss which has been referred by the eminent bryologist Berggren to *Hypnum turgescens*, an arctic moss only found living in temperate latitudes on the extreme heights of the Alps."

New Species of Oreodon.—Lord Walsingham has brought home from the Miocene deposits of Nebraska, a series of mammalian remains embedded in masses of the original rock, which turn out to be a new species of *Oreodon*, larger than any hitherto described from America. "The deposits of the Mauvaises Terres, Nebraska," says Professor Leidy, "are remarkable for the great quantity of fossil remains of mammals and turtles they have yielded without further exploration than picking them up from the surface of the country. Detached from the neighbouring soft and readily disintegrating rocks, the fossils lie strewn about, and have often attracted the attention of the least curious of those who have traversed this district. Many of the loose fossils have gradually been collected by travellers and others, so that few of a conspicuous character now remain. Of those collected, by far the greater part have been submitted to my investigations, and these have amounted to the enormous quantity of between three and four tons in weight."

NOTES AND QUERIES.

Swans and Cygnets.—In your number of Science-Gossip for July, I notice that one of your correspondents, Mr. Alchin, inquires whether it is usual for swans to carry cygnets on their back. I have myself often observed this method of transit by the parent birds, but I have never heard any good reason assigned. A few weeks ago a black-necked swan (*Cygnus nigricollis*) hatched some young ones in the Zoological Gardens, and I have often witnessed the latter carried on the back of the mother, and a very pretty sight it was. The entire family were here in a tank or small pond in the gardens, where the water is virtually stagnant.

Certainly there was no stream or current existing which could offer any barrier to the cygnets' progress. Dixon, in his work on Ornamental and Domestic Poultry, now I believe out of print, remarks, at page 29, "As hunger is satisfied, and weariness comes on, the maternal swan will sink in the stream of a river till her back becomes an easy landing-place, and the nurslings are thus transferred in a secure and downy cradle to fresh feeding-places." I suspect a vast deal yet remains to be learnt regarding the economy and instincts of swans. It has been stated that they have an instinctive prescience before a flood or sudden rise of water, to raise their nests to save their eggs from being chilled by the water, by raising weeds, grasses, &c., in the same way as beavers build high dams as a prevention against spring floods.—*John Colebrooke.*

Moonshine?—Can any of your readers explain the following, which is held by the peasantry in this part of the country; viz. that the flax or lint must be put to steep before or after the change of the moon; for if the moon shines upon the water in which the flax is steeping, it will stop what is called the watering process—a piece of iron thrown into the water will set all right if this should occur.—*Rev. S. A. Brenan, Pomeroy, co. Tyrone.*

Blue-bottle Fly.—Is it an uncommon thing to see a blue-bottle fly going from flower to flower sipping the honey as a bee does? I observed one in my greenhouse regaling itself on the flowers of a saxifrage.—*S. A. B.*

Strange Problem in Natural History.—Mr. Alexander, of Termon Rectory, co. Tyrone, in the month of July, while fishing for trout in an adjoining lake, caught one which had a stone embedded in its tongue. How could this have happened?—*S. A. B.*

Affection of the Partridge.—The affection and solicitude of the female partridge for her eggs and young is verg great, and instances are frequently seen by the rural naturalist in his rambles. The closeness with which she will sit when about hatching is remarkable. I once found a nest containing seventeen eggs, on which the female was sitting, and instead of flying rapidly away when I approached, she allowed me to stroke her glossy head and soft plumage, seeming to appreciate the familiarity. Her confidence gained its reward, as all of the eggs were duly hatched. A gentleman in this neighbourhood, when jumping across a hedge, lighted with a foot on each side of a partridge nest, on which the female was sitting. The affectionate bird did not stir, and even allowed the gentleman to stroke and fondle her. But more admirable still is the address with which both male and female will draw the spectator away from the neighbourhood of their brood. Last July, when walking along the highway, I disturbed two partridges near some tall grass. With startled cries they whirred away, and alighting a few yards off, in the middle of the road, went through a series of manœuvres as if desperately wounded,—both of them grovelling along on their bellies in the dust, and seeming to tumble over and over in their eagerness. Stopping some distance off, they began to utter curious plaintive cries. Being somewhat in a hurry, I did not institute a search for the cause of this little drama—the young; but I have seen a similar instance, in which case I captured one of the plump little chicks, and held it for a time in my hands; but the distress of the old bird became so great, that I soon released it. In June, 1868, a pair of partridges had their nest in the clover field opposite, the mowers thoughtfully leaving a tuft of clover to shield the nest. It was very amusing to see how careful the old birds were to prevent attention being drawn to their almost exposed nest. Both of them would go in search of food, and then fly back into the field together, alighting within a few yards of the nest, and having anxiously scanned the neighbourhood for a time, the female would slily approach in a crouching attitude, and creep into the nest.—*W. H. Warner, Kingston, Abingdon.*

Curious Emergence of Ants.—Beneath the floor of a cellar, which had been for some time unused, a nest had been constructed by the common garden ant (*F. nigra*), but, much to the alarm of the insects, a considerable quantity of coals was placed thereupon. Availing themselves of some few interstices which were left here and there, they managed to carry on their proceedings as usual, and sent out foraging parties into the gardens. This continued for several weeks, and one day, at the beginning of August, the surface of the coal was discovered to be swarming with male and female ants. As their wings were in perfect order, it would hardly seem possible that they could have worked their way up through the dust and fragments of coal without assistance from the other ants. Probably the workers dragged the pupæ in such positions as would be most favourable for their extrication in an uninjured condition.

Leaf-cutter Bee.—For five summers, a rose-leaf-cutter bee has built her nest in a narrow-spouted watering-pot in my garden, and I have just heard of another nest, found in the touch-hole of a gun belonging to our volunteer artillery. My books on entomology only mention these bees' nests as found in earth or cavities of walls; therefore I venture to record the above as rather unusual localities.—*J. C.*

Southern Birds.—Allow me to suggest in answer to "H. G.'s" query on Southern Birds, that "Molly Manks" are the Fulmar Petrel.—*Vide* Bewick's "Birds," and Kingsley's "Water Babies." Are "Whale-birds" identical with them?—*Julia Colson.*

The Flight of Birds.—If Mr. T. Guthrie consults the Duke of Argyll's "Reign of Law," he will find in pages 159 to 161 an explanation how hawks, at least certain species, are enabled to remain suspended in the air without any forward motion, and without any movement of the wing. The necessary conditions are a strong wind, large and powerful and pointed wings, the body hung at an angle to the horizon, and the head turned towards the wind. With a strong wind no flapping is required, the force of the wind counteracting the force of gravity. In a calm, some muscular force must be resorted to. Mr. Guthrie will find the chapter on the flight of birds, and indeed the whole volume, most instructive and interesting.—*Fred. H. Lang.*

A Strange Incident.—Can any of your readers throw any light on the following strange incident? A cow, belonging to a person in the co. Armagh, which was bought in a fair, and supposed to be in calf at the time, and not giving milk when bought,

at the time when she was supposed to calve, fell down suffering from the pains of parturition; after a short time she got up seemingly all right. On the following day the same thing occurred, when a flow of milk came to the udder, and she has been milked regularly ever since, no calf having ever been born. The cow is in perfect health.—*S. A. B.*

Mole.—In answer to Mr. W. H. Warner's query, I beg to state, from the authority of the late Mr. Wm. Thompson, in his "Nat. Hist. of Ireland," that the mole is not indigenous. "It is singular," he says, "when entering Scotland or Wales at the nearest points to Ireland, to see molehills in both these countries almost as soon as we land."—*Rev. S. A. Brenán, Pomeroy.*

"Glow-worms," p. 190.—As the Editor of Science-Gossip has remarked, "it is the female glowworm that glows;" but I have seen larvæ slightly luminous, although I do not fancy they are all so gifted, possibly only those which will develop into females: the head of the male, with its wonderfully developed eyes, is well worth examination. —*E. P. P.*

Old Tree.—There has been some correspondence about great trees lately. Here in the south of London, there is an old elm in the garden of a friend of mine. The trunk is thirty-four feet in circumference, and still bears many vigorous branches.—*E. P. P.*

Notes on Aphides, p. 173.—Mr. Westropp states that he saw an aphis on a currant leaf give birth to a young one, which "regaled itself on the juice that came from the syrup-tubes of its parent." It would be interesting to know if he has seen this more than once. If only once, was the insect on a leaf attached to the bush, and was the bush out of doors? How was he watching the insect, under a simple lens, or on the stage of a microscope, and what was the power of the instrument used? I am sorry to ask so many questions, but would fain learn if he has ever seen an aphis laying eggs; if so, what was the species? was the insect winged? and what was the colour of the egg?—*E. P. P.*

Flight of Birds.—In a recent No. of Science-Gossip, at p. 161, I see a paragraph on the flight of birds. Allow me to state that the phenomenon noticed by Mr. Guthrie is fully explained in "The Reign of Law," by the Duke of Argyll. I have not the book by me, and therefore cannot give the exact reference. I strongly recommend your correspondent, and any one else interested in the laws regulating the flight of birds, to read this book, as it is well worth careful study.—*Arthur F. Buxton.*

Quicksightedness of Sparrows.—I have no doubt that these birds, when they have been accustomed to frequent gardens and the vicinity of houses, watch the proceedings of human beings very closely, especially those from whom they have received food. This I have proved repeatedly by placing a moth upon the trunk or branch of a tree, when within the course of a short time after, some inquisitive sparrow would visit the spot and demolish the specimen, only leaving the wings to tell the tale. Should we wish to make some experiments as to the times of flight of different species, by depositing them at liberty on trees or palings, it is needful to select places where our proceedings will not be spotted by hungry and investigating sparrows. Under ordinary circumstances, these birds (and some other species) destroy many of the moths which repose on trees; and hence it is that many of these insects, when they have expanded their wings, creep down the trunks to hide in the herbage beneath.—*J. R. S. C.*

Goat-moths.—One morning in August, 1872, we took on an ash-tree near our garden, two larvæ of *Cossus ligniperda,* and in the afternoon of the same day observed about half a dozen more in various stages of growth. The first two we kept through the winter under a bell-glass, with a supply of willow wood, into which they very soon disappeared. At the beginning of this month our patience was rewarded by the appearance of two moths. I may remark that the ash-tree mentioned above is also infested by large numbers of wasps and Red Admirals.—*J. M. A.*

The Potato and Teutonic Tradition (p. 160). —It is difficult to conceive of any possible connection between an "old Teutonic tradition" and the potato, which was only introduced in 1586, and certainly unknown before the discovery of America. And as to the supposed benign influence of Gemini (surely potatoes were not, even in Teutonic tradition, usually planted in May), the heavenly twins, who themselves, I believe, left no earthly descendants, have not been generally credited with any such prolific power; unless, indeed, the supposed unluckiness of marriages in May is to be attributed to a provident caution on the part of the future *paterfamilias* as to the probable consequences of a too rapid increase of family.—*R. P.*

Legends and History of Certain Plants (p. 151).—"It was once a custom to pass cripples through a natural rupture in this tree as a means of cure." This is hardly correct: the "cripple" was "naturally ruptured;" the tree was split in order to effect his cure. Gilbert White gives the following account of the process:—"These trees, when young and flexible, were severed, and held open by wedges, while ruptured children, stripped naked, were pushed through the aperture, under a persuasion that by such a process the poor babes would be cured of their infirmity. As soon as the operation was over, the tree, in the suffering part, was plastered with loam, and carefully swathed up. If the parts coalesced and soldered together, as usually fell out when the feat was performed with any adroitness at all, the party was cured; but when the cleft continued to gape, the operation, it was supposed, would prove ineffectual." (Letter 27 to Daines Barrington.) And Mr. Bennett adds in a note, that "as ashes seldom fail to grow together after being split, so also does it rarely happen that infants afflicted with umbilical hernia fail to be relieved from it at a very early age." *Fraxinus,* I may add, does not mean "lance," and the connection between this tree and the doctrine of the Fall of Man, which, by the way, finds no place in Scandinavian mythology (Pliny's supposed antipathy between the serpent and the ash would be more to the purpose), has no real foundation. The same may be said for Askenay, and in rather stronger language. The derivations of "briar" from Briareus, and "agrimonia" (*Argos*), and the extraordinary appearance of Mercury "in his character of Hermes, the Physician," are equally unwarrantable (p. 150). *Vervain* (p. 152) must have altered its habits very much since the days of the Druids, if it ever grew on "spots on which the sun and moon had never shone."—*R. A. Pryor.*

MOUNTING FUNGI.—Would any readers of SCIENCE-GOSSIP kindly give a little general information on the mounting of microscopic fungi?—*E. L. Hull.*

SINGING MICE.—Your correspondent J. Sim seems to have been rather surprised by the voice of the singing mouse in his own house. I suppose it is not so very rare a thing; for I frequently hear them of an evening, and that while the family are sitting up, and in the same room. The song, as he says, generally continues for four or five minutes, and then "gradually gets sweeter and lower until it dies away."—*W. S. Palmer.*

THE BOTANICAL LOCALITY RECORD CLUB.—As a botanist I am heartily glad to see what protectors of our plant rarities we possess in the persons of Mr. Atkinson and Mr. Gulliver, and with what jealousy and care those gentlemen seem to view everything which they think may tend to their invasion and possible extermination. But in the Botanical Locality Record Club, as far as I am acquainted with its objects to understand them, I can scarcely see the reason for such a fear; especially if the precautions, as indicated by Mr. T. B. Blow in SCIENCE-GOSSIP, July 1, 1873, p. 167, be *judiciously* carried out. The only cause for fear which I entertain in connection with it is as regards the mode of admission to membership. This I think is scarcely guarded enough to be safe, and needs, on that account, being made more conditional, &c., so as to prevent within its pale the possible admission of any but the *bonâ fide* botanist. As it is, Mr. Blow speaks with too much of uncertainty of its at present members in that of saying he thinks they are all of that belonging. And if, as I take it, the work of recording is to be carried on through their medium, then how obvious the necessity for some such precaution becomes, and that not only on account of insuring the trustworthiness of their records, but as being also a better guarantee and surety of freeing the plants from the danger so much apprehended by Mr. Atkinson and Mr. Gulliver. Whereas, under a system less heeded in the latter respect, the opposite result might follow. Though in either case I don't think the Club would prove near such an evil in that particular as would a system, like that alluded to by Mr. Gulliver in the GOSSIP for July, which encourages a spirit of competition in its members by holding out prizes to those who can obtain the largest and best collection. Besides, the object of the Botanical Record Club is a good one, which, I think, cannot be well gainsaid; therefore if the means by which it seeks to attain it is not considered equally so, then let us, in such a case, rather try to improve the means than lose the end. I have thought that perhaps a better plan of achieving the object of the Club would be for the different Field Naturalists' Societies, local and provincial, to co-operate together towards its accomplishment. By this means I consider the work could be more efficiently done, besides being, when done, more reliable as a reference and scientific as a book. In saying so I would not be understood to speak disparagingly of the Club or its promoters.—*John Harrison.*

WATER ANIMALCULÆ.—A few weeks ago, as I was examining under the microscope (½-inch objective) some water from the gutter running along the top of the house, I was much interested in the motions of some small animalculæ. They were of a circular form and had a bright crimson spot in the middle, with an outer ring of orange. Can any of your readers tell me if they have ever observed the same thing? These animalculæ had a rapid revolving motion. In a few days it rained again, and these creatures had gone.—*H. C. M.*

EPILOBIUM ANGUSTIFOLIUM.—In the SCIENCE-GOSSIP for May, p. 113, Mr. R. A. Pryor there writes, inquiring from me information as to which of the two forms the plant in question belongs—whether *brachycarpum* or *macrocarpum*. I have now much pleasure in stating to him that it is the latter variety of plant, viz. *Epilobium macrocarpum.* —*John Harrison.*

SWANS AND CYGNETS.—Permit me to add a supplement to my letter to you of the 26th ult. Mr. Harting, in his excellent work on the ornithology of Shakespeare, gives extracts from Yarrell's "History of British Birds" and Jesse's "Gleanings in Natural History," which show that cygnets are frequently carried on the back of the female swan. The author also quotes a passage from Shakespeare in King Henry VI.

> "So doth the swan her downy cygnets save,
> Keeping them prisoners underneath her wings."
> Henry VI., Part I., Act v., Scene 3.

Mr. Harting writes, "By the expression underneath her wings, we may understand under shelter of her wings, which she arches over her back, whereon the young are seated. This habit," he also remarks, "has been observed in many other water-birds, especially in the Grebes."—*John Colebrooke.*

SONGS OF BIRDS (p. 166).—In Mudie's "British Birds, "P." will find the following:—"There is no mistaking the nightingale, as no bird sings at the time when its song has the greatest effect; and, though the bird often sings when there is light enough to see it, it is just as much concealed as during the night. * * * * They do not sing from the very depths of close forest, but from the tall and thick trees that are near open places, abounding in underwood or other cover upon the ground." Of the blackcap Mudie says:—"Its song is generally given from a high perch, or an elevated branch, or the top twig, if the tree be not very lofty. * * * * It has the wildest and most witching notes of all our warblers; it has not, certainly, the volume and variety of the nightingale, neither has it the ineffably sweet chant of the garden warbler; but its notes take one by surprise; and the changes, and especially the trills, are finer than those of any other bird. The song, when the bird is at rest, appears to be, by turns, like those of several birds; but it transposes them into a lower or rather a minor key, and finishes off with variations of its own; and, as is the case of some of the more impassioned musical composers, the very genius (so to speak) of the bird interferes with the melody, and a sort of indescribable wildness is the character of the whole." "P." will find in this work of two volumes aid to distinguishing the songs of birds similar to those quoted above, jointly, in some instances, with their notes.—*C. Robson, Newcastle upon-Tyne.*

WILD ARTICHOKE ("T. B. W.")—Artichoke (*Cynara scolymus*) cultivated in Italy and first brought from thence to England in the reign of Henry VIII. Evelyn tells us "that for some time it was so rare in England as to be sold for crowns apiece." The Italians stewed it till its tough leaves were tender, and the French eat it as a salad." The Jerusalem

Artichoke (*Helianthus tuberosus*), a species of sunflower, was brought into Italy from Peru, and called by the Italians *Girasole* (turnsole) *articiocco*, the name corrupted by the English in Jerusalem Artichoke. Was not the *Cynara scolymus* also brought from South America?—*J. R. J.*

How to send Objects through the Post.—I am often grieved, on reading your "notices to correspondents," to see the complaints of articles being received in such a "smashed" state as to be useless; and in your number for this month it is recommended to inclose them in a tin box to withstand the energy of the post-office officials. But even that is not safe; for though the said box itself may not be broken by the tremendous whack the said officials usually lay on, yet still, very delicate objects inside may be injured by concussion. In short there is a better way, by which I have sent microscopic objects hundreds of miles and numerous times, without the slightest injury. It is as follows. It is quite a mistake to place stamps upon the box itself. They should be fixed to one of the common luggage labels, which is then attached to the box by a reliable piece of string, so as to separate it from the box about two inches. The "official" may then whack away at the luggage label to his heart's content, and no harm be done. In this case the box need not be strong; and, to prove this I now send, for your acceptance, a very fine specimen of the *Chirodota violacea*, popularly known as "Pharaoh's chariot-wheels." The containing box, you see, is purposely slight; and yet, I will venture to say, you will receive the slide uninjured; and, if so, I hope you will inform your readers of the fact; and draw their attention to the impropriety of placing their stamps on the box. I will merely add that by the "common luggage label" I mean those made of paper pasted on cloth; and having a small ring at one end. They are sold by the dozen at almost every stationer's shop. I must add that I do not claim the merit of the invention. It is by no means new, but, nevertheless, does not appear to be known to many. One more remark. The address should be written (as you see I have) on the label itself; and, though not absolutely needful, it is a good plan to wrap the box in black paper, which prevents all temptation to stamp it; as in that case the stamp will not be seen.—*H. U. J.*

[Our correspondent is quite right. His frail box reached us safely, and we cannot but be glad of the Post-office energy which has happened so fortunately for us!—Ed.]

Black Smut.—In the last number of Science-Gossip, p. 164, a correspondent inquires for the name of the black smut which is so apt to cover the leaves of orange and other greenhouse plants. If "F.G.M." will closely examine the stem and leaves of the plants on which the smut occurs, I think he will find them infested with the Scale insect, and the black smut is simply the excrementitious matter from it. The same appearance occurs on the leaves of plants infested with the Aphis or green-fly, doubtless from the same cause.—*J. F. Cranswick.*

The Landrail (*Crex pratensis*).—This bird, usually quite common in our neighbourhood, has, this season, neither been seen nor heard. In former years I have known a man cut out as many as twenty eggs in one field. I should like to hear whether it has disappeared thus in other parts of the country, and what reason can be assigned for it. —*Fred. Anderson, Alresford.*

Songs of Birds (p. 166).—With reference to this subject I send the following, which I came across the other day, for what it may be worth:—"The song of the Nightingale is thus transcribed by Bechstein, from whom it is quoted by Broderip:—Zozozozozozozozozozozozozo—zirrhading—Hezezezezezezezezezezezezezezeze cowar ho dze hoi—Hi gai gai gai gai gai gai gai gai gai gai gai guai gai—Coricor dzio dzio pi."—*J. Anderson, Jun.*

Eggs of Snails.—Will any reader inform me how to preserve the eggs of *Helix pomatia* in a dry state, to retain their form? They are to be seen thus preserved in the British Museum.—*E. B. F.*

Death's-head Moth, &c.—In several Entomological books I have seen it stated that the Death's-head moth is common in Kent. I have lived in Kent for four years, and have searched particularly for this moth, and have not even seen a single specimen. Can any of your correspondents explain this? A friend of mine has caught a rare Swallow-tail in the neighbourhood of Brockley, and another friend saw one of these moths on a wall on the railway banks near the same place last year. A specimen of *Polyommatus Cœticus*, the long-tailed Blue, has also been caught near here, and is now in the possession of a publican in Deptford.—*C. B. Barnes.*

Maggots on Stuffed Birds.—Could you tell me of any way of getting rid of maggots from stuffed birds, without injuring the plumage? I have tried several things, but without success.—*R. M.*

An Adventure with a Mousetrap.—A friend of mine being annoyed by the mice in his pigeon-house, set an ordinary penny mousetrap baited with cheese. The bait was soon taken off, but, owing to the catch being rather stiff, the door did not fall; he however left the trap as it was for a day or two, when one morning he was astonished to find five nearly full-grown mice caught in it. Why they all got in together is a mystery, as they had scarcely room to move; and there was no bait of any sort in the trap at the time.—*E. Lovett.*

Swans and Cygnets.—In answer to J. H. Alchin's question regarding the manner in which swans assist their young when swimming up stream, allow me to state that it is a very common occurrence, and may be often seen on the Thames this time of the year (June and July). Also when crossing a stream the parent bird will place herself so as to be between the force of the current and offspring, and, stretching out her wings, they shelter themselves beneath it, and swim safely across.—*Thomas C. Oborn, Surrey.*

Glass Shade.—Can any of your correspondents tell me how I could cement the angles of an oblong glass shade, so as to make it water-tight, and serve as an aquarium?—*W. K. G.*

The Cuckoo (p. 164).—Might I venture to ask Mr. John Hopkinson what reason he has for saying that the Cuckoo "robs other birds of their food," as such a habit of this singular bird is entirely new to me?—*W. H. Warner, Kingston.*

Spotted Fly-catcher.—A pair of these birds rear two broods of young every year in a jargonelle pear-tree trained against the walls of this house. The female, when sitting, occasionally leaves the nest to stretch her limbs, and generally takes her station on the top of an old-fashioned arbour close

by. There she remains quietly till the male arrives with food, which she receives from him, gaping and shivering her wings like a young bird. — *W. H. Warner, Kingston.*

Praying Mantis. — Will some of your correspondents kindly send a description of the "Praying Mantis" to Science-Gossip?—*E. C.*

The Oldest Trees (p. 142).—Your correspondent will find pretty well all that is known about aged, or otherwise remarkable trees, in Great Britain, in the third volume of the *Arboretum Britannicum,* where Mr. Loudon has collected a great deal of information on the subject. It is to be feared, however, that the traditions on which the reputed great age of certain individual trees has been supposed to rest, are at best but untrustworthy, and the identifications frequently uncertain. I have extracted some of the more conspicuous instances, but the subject is treated at great length, and with very considerable detail, so as to make it impossible to give more than a very limited selection.—Oaks (vol. iii. p. 1775). "Those oaks in England which are reputed to be the oldest are: the Parliament Oak [mentioned by your correspondent]; Cowper's Oak (Northampton); the Winfarthing Oak, which is said to have been an old oak at the time of the Conquest (Norfolk); the Nannan Oak, which was a hollow oak in the reign of Henry IV. (Merionethshire); the Salcey Forest Oak (Northampton); and the Bull Oak in Wedgenock Park (Warwick), which was made a park about the time of Henry I. To these might be added several others, perhaps of equal age, such as the Flitton Oak (Devon), but which have not attracted public attention in that particular so much as those above enumerated." Spanish Chestnut (pp. 1988-99).—"The old Chestnut at Tortworth (Gloucester) may possibly have been one of those planted by the Romans, and is mentioned as a famous tree in King John's time, and by Evelyn, in his 'Sylva,' to have been so remarkable for its magnitude in the reign of King Stephen as then to be called the great Chestnut of Tortworth, from which it may reasonably be presumed to have been standing before the Conquest." Yews (vol. iv. pp. 2073-80).—"Fountains (York), thought to be over 800 years old; Aukerwyke (Bucks), said to be upwards of 1,000 years old; the Darley Yew (Derby), according to Decandolle's method of calculating the age of trees, would be 1,356 years old; but these are all thrown into the shade by the Fortingal Yew (Perth), which venerable yew, in all probability a flourishing tree at the commencement of the Christian era, may yet survive for centuries to come." Some of these trees, however, have ceased to exist since the date (1838) when Loudon wrote.—*R. A. Pryor.*

The Camberwell Beauty.—I think it may interest entomologists to hear that I caught last week, at Mapledurham, near Reading, a small but perfect specimen of the rare butterfly, "Camberwell Beauty" (*Vanessa antiopa*).—*Reginald M. Glazbrook.*

Wasp.—The common wasp is of a very predatory disposition. Last August I saw a flying wasp bear to the ground a fly almost as large as itself, which struggled desperately to escape; whereupon the wasp, holding the fly in its grasp, bent over the end of its body and stung it repeatedly, and, having thus disabled it, flew off with it.—*W. H. Warner, Kingston.*

Smoke from Steamboats.—Whilst staying at Folkestone lately I observed a curious phenomenon in the action of smoke from steamboats. On some days the smoke rose high, and, mixing with the atmosphere, was soon lost to sight. On other days the smoke could not rise, but formed long lines, with a smooth straight upper surface and an undulating lower one; this condition exactly reversing the undulating and straight lines exhibited in mountainous regions by the clouds, as they gradually rise in the morning. May I conclude from this that there are certain conditions of atmosphere, which conditions are below the moisture, and above the smoke,—the height of these conditions being dependent on temperature and moisture? —*H. P. Malet.*

Canadian Natural History.—A scientific and microscopic amateur, about to take a trip to Canada, asks for suggestions, &c., as to specimens and objects of interest.—*F. M. S., Blackrod Vicarage, Chorley, Lancashire.*

The Stag-beetle (*Lucanus cervus*).—Until this season I had only known this insect by straggling specimens picked up in the vicinity of the metropolis, but on the 28th of June last I witnessed quite a flight of the species between 8 and 9 p.m. This was along the edge of a field, and over the adjacent road, between Gravesend and Swanscombe. It would have been easy to capture dozens, had any one so desired; since, though the beetles rose occasionally to a considerable height among the trees, they often came along a few feet from the ground, and some actually descended to it, or else "pitched" upon the palings adjacent. What was the object of their aërial excursion was not evident; it was not, seemingly, the attraction of the opposite sex, for not a female was to be seen about. These males had, to appearance, just emerged from the pupæ, and thus, probably, preceded the female insects, which are much more shy in their habits, and whenever they are found, are generally crawling on the earth, or reposing on some tree-trunk. Like other large beetles, the "Stag," when its flight is interrupted, has considerable difficulty in getting off again, and a start from a flat surface is quite out of the question. I had another opportunity of verifying a fact, to which I have already called attention, and in regard to which opposing opinions have been expressed; viz., as to the biting proclivities of the insect. As stated, under ordinary circumstances, these beetles are not inclined to use the horns as a means of defence, otherwise than by threatening with them. This they will do at once if the finger is held near them, raising the front segments, and quivering the palpi, but they will not attempt to advance and seize any object; and even should the finger, or any other object be thrust between the horns, they rarely close them. This at least has been my experience; whether in some counties they are more inclined to bite, or at certain states of the weather (as at least is possible), I cannot venture to say.—*J. R. S. C.*

Water Dropwort. — Professor Cameron, of Dublin, reports to the *Lancet,* that seventy-four head of oxen were turned into a demesne of Lord Dunraven, at Adare, co. Limerick, in April last. In a few days the animals began to sicken; in a week forty-three died. On investigation it was discovered they were poisoned by eating Water Dropwort (*Œnanthe crocata*). Seeing some notice of poisoning by this plant in Science-Gossip, I send the above contribution. —*F. H.*

NOTICES TO CORRESPONDENTS.

T. Q. Couch.—The vipers arrived safely, for which accept our thanks. On the first opportunity we purpose dissecting them, and will then report.

C. Robson.—Your slide came duly to hand. We think you have succeeded in carrying out Mr. Ashbury's directions admirably.

Rev. H. R.—Your cabbage-leaf is very peculiar, and we have sent it to one of our principal teratologists for further description.

H. M. Ward.—The plant is undoubtedly *Origanum vulgare*, and the absence of stamens may be due to the absence of proper nutrition—a not uncommon occurrence. We should like to hear of the other abnormal plants.

T. Tapley.—The protuberances on the leaf are the work of a species of *Cynips*, which punctures the epidermis of the leaf, and thus produces the blisters.

T. M. Hoare.—Your letter concerning the moth's eggs did not contain any specimens.

T. Jobson.—Your specimens are the crystals of fluor spar, a fluate of lime.

R. M. P.—"Half-Hours at the Seaside" (London: Hardwicke) will give you all the information you require.

L. S.—*Lilium auratum* may be obtained at any good florist's, at a reasonable price.

E. W. E. H.—Our correspondent is informed that there is in existence the Glasgow Society of Field Naturalists, doing good work in the reading of papers, chiefly on botanical subjects, and in making excursions to various places of interest. The president is Dr. Stirton, and the secretary Mr. D. Gregorson, 122, West Graham-street, Glasgow, from whom, we doubt not, any information may be obtained.

J. D. Robinson.—From your rough sketch we judge the creature in question to be one of the "Water-bears," a *tardigrade animalcule*.

E. L.—We must crave the indulgence of contributors who kindly furnish us with original communications, on the ground that we receive nearly twice as much matter as we can print. Your communication is in type, but we observe the rule of priority as far as we possibly can. Perhaps others will take the hint, and remember that we are bound by the inexorable limits of space. We need not say that we are always glad to hear from our contributors.

Maberley wants to know where the rarest butterflies can be obtained. Perhaps some of our entomological readers will help him to the information.

T. B. Cardiff.—No. 1, the Toad Rush (*Juncus bufonius*); No. 2, Wild Carrot (*Daucus carota*); No. 3, Crosswort (*Galium cruciatum*).

John R. C.—The empty egg-case of the Dog-fish.

O. M.—The fragment of coral sent was very much water-worn. It appears to be a portion of *Astrea pallida*.

E. J. Williams.—The eggs are—1, the Cuckoo; 2, Lapwing; 3, Bullfinch; 4, Nuthatch;—the first and last good additions to the cabinet.

W. A. C.—Your leaf and insects arrived smashed into a black and unrecognizable mass. As you have neither mentioned the name of the plant nor the manner in which its leaves were rolled, and as editors are unfortunately not gifted with supernatural insight, it is impossible to answer your query.—C. G. B.

C. B. Brearey.—The beetles (which arrived in fragments, owing to your not having inclosed them in a quill or stout pill-box) are *Meligethes æneus*, the commonest of our indigenous *Nitidulidæ*. It especially attacks cruciferous plants, but also swarms on nettles, &c.: there is an account of injuries to *cultivated* plants caused by it, by Herr Künstler, in the "Verhandlungen der Zool.-Bot. Gesellschaft in Wien," vol. xxi. p. 46. You will find an account of the beetles from the wrecked French ship to which you refer in the "Entomologist's Monthly Magazine," vol. ix. p. 217, by Mr. R. Lawson, of Scarborough. These were the common "pea-weevil," *Bruchus rufimanus*, one of the *Rhynchophora*, found in pods of peas or beans, and of course having not the most remote connection with the *Meligethes*.—E. G. R.

E. Brown.—Your plant appears to be *Stellaria aquatica*; but it was so badly and hastily crammed into the envelope that it is very difficult to make out. If our friends who send us plants to name would take the trouble to mount them, it would save us much trouble and doubt.

R. J. Lund.—Only one specimen of fern with the bud mentioned reached us. It is the Bladder Fern (*Cystopteris fragilis*). We never heard of its being proliferous before, but perhaps it was taken from a rich soil.

J. W. L.—The sea-weed obtained on the east coast, near Marsden, is *Ptilota plumosa*.

EXCHANGES.

For seeds of *Eccremocarpus scaber*, *Nicotiana tabacum*, *Campanula speculum*, and *Apium graveolens*, send stamped directed envelope, and any object, to E. Lamplough, Messrs. Gee & Co., Hull.

A good variety of Fossil Teeth, Bones, Spines, Scales, &c., correctly named, for section-cutting, offered for microscopic Slide.—Send lists to E. Lovett, Holly Mount, Croydon.

Slides of *Tabanus autumnalis* and Horse-fly (*Œstrus* (*gasterophilus*) *equi*), for Slides of *Asilus crabroniformis*, and lancets of *Culex pipiens*.—J. O. Harper, Dereham-road, Norwich.

British specimens of *Sphagnum Lindbergii* and other mosses, for rare mosses, hepaticæ, or lichens.—F. Howse, Highfield, Sydenham Hill.

Several fine and rich newly discovered diatom deposits from Aberdeen, named, for other good material, &c.—H. B. Thomas, Boston, Lincolnshire.

Hair of Ornithorhynchus for unmounted Microscopical material.—Address, J. H., 43, Devonshire-road, Holloway, N.

Carduus setosus, offered for *C. tuberosus*.—R. Morton Middleton, jun., Greatham, West Hartlepool.

First-class slides offered for fresh specimens of Mole Cricket, Field Cricket, or large green Grasshoppers.—C. L. Jackson, 11, Hesketh-street, Southport.

Well-set Lepidoptera for Birds' Eggs, or land and fresh-water Shells.—Thos. H. Hedworth, Dunston, Gateshead.

Sections of Porcupine Quill (unmounted) for other microscopic objects.—T. M. Hoare, The Hill, Hampstead, London.

Living specimens of *Isoetes hystrix* for British or Foreign Lepidoptera, well-set and in good condition.—W. A. Luff, Mansell-street, Guernsey.

Well-rooted plants of good varieties of exotic ferns, for other varieties. List sent and required.—Address, M. M., Post-office, Faversham, Kent.

The new and rare Foraminifer *Saccamminina Carteri* (mounted), from the Carboniferous Limestone, for any well-mounted microscopic object.—Apply, Rev. W. Howchin, Newgate-street, Morpeth.

Send an addressed stamped envelope to Mr. J. T. Peacock, Sudbury House, Hammersmith, for Raphides of *Echino-Cactus Vesnaga*, a monster Cactus, just imported from South America.

BOOKS RECEIVED.

"Animal World." August.

"Thoughts, Philosophical and Medical." from the works of Francis Bacon. By John Dowson, M.D. London: H. K. Lewis.

"Canada Medical and Surgical Journal." July, 1873.

"Monthly Microscopical Journal." August.

"Astronomical Register." August.

"Les Mondes."

"Journal of Applied Science." August.

"Report of the Commissioner of Agriculture," for 1871 Washington: Government Printing Office.

"Special Report on Immigration." By Edward Young. Washington: Government Office.

"Monthly Reports of the Department of Agriculture," for 1872. Washington: Government Printing Office.

"Journal of Proceedings of Winchester and Hampshire Scientific and Literary Society. Vol. i., Part ii., 1871-72.

"American Naturalist."

"Canadian Entomologist."

Communications received up to 12th inst., from.—J. R. S. C.—E. R. F.—E. C. L.—M. D.—J. A.—F. A.—E. E. —L. S.—J. F. C.—J. S. Jun.—J. W. L.—C. R.—R. J. L.—T. B. B.—C. C.—R. G. B.—H. P. M.—F. M. S.—J. E. W.—J. H.—H. U. J.—F. H.—J. R. J.—E. C.—G. H. K.—T. H. H. —J. M. A.—J. D. R.—D. G.—T. R.—C. R.—J. A.—T. E. A.—A. F. B.—H. M. W.—R. A. P.—W. S. P.—H. U. J.—T. M. H. —T. B. B.—F. A.—T. T.—J. C.—E. C. L.—R. M. M.—E. L.—E. P. P.—R. T. L.—J. H.—H. C. M.—R. W.—R. J. L.—A. A. —W. H. W.—H. R.—W. A. C.—J. F.—J. J. E.—S. A. B.—F. H. L.—J. C.—T. H.—E. L.—H. G. G.—R. W. O. R.—W. H. K.—S. G. B. W.—W. H. W.—J. T. P.—W. M.—E. B. F.—W. H.—J. O. H.—C. L. J.—E. B.—H. B. T.—J. H.—J. K.—E. W.—J. D.—W. A. L.

RAMBLES AMONG THE MODERN VOLCANOES OF ITALY.

No. 2.

PHLEGRÆAN FIELDS.—The district which received this Grecian (Φλέγρα) name on account of its fiery appearances, and which is so often referred to in the classic poets as the scene of giant and god wars, is situated on the northern side of the Bay of Naples, and has few rivals either in beauty or interest. Naples, with Vesuvius and the buried cities of Herculaneum and Pompeii to the south, and the Phlegræan Fields to the north, becomes indeed such a centre of attraction, that few places can surpass it. At first we will confine our attention to some of the chief points of geological note north and west of Naples.

From the hill upon which the Castle of St. Elmo is built we look across the blue bay to Vesuvius and Sorrento in one direction, and in another down on to the main mass of the city, surrounded on all sides but one by an encircling ring of hill, of which the rock of the Castle of St. Elmo forms a part. On an examination of this encircling hill, it is found to consist of beds of ash of a light yellow or white colour, dipping outwards or away from the inclosed hollow; in fact, the first glance reveals the curious fact that Naples, a city of some 500,000 inhabitants, is built in great part within an old broken-down volcanic crater.

The whole tract of country, from Naples on the east to Cumæ on the west, is one mass of craters, some fresh and young-looking, others worn down and almost obliterated; some large, others small; some having their interior clad with vineyards or wood, and richly cultivated, others inclosing a calm and peaceful lake; but all interfering with one another more or less, old craters being destroyed in the formation of new ones, and all presenting the general structure of beds of pumice-tuff dipping away on all sides from the central orifice. The country presents, in fact, a universal blistered surface. Passing from the city through the long tunnel of Posilipo, in which are seen strata of stratified volcanic ash, a short drive brings us to the Lake of Agnano, now,—alas for the scenery!—being drained into the Mediterranean.* This is a crater-lake, similar in all respects to those already mentioned near Rome, and though apparently all is peaceful, and the waters of the lake reflect its well-wooded and picturesque banks, yet there are ever rising in bubbles through the water and from fissures around the edge, volumes of carbonic acid gas and sulphureous vapours, pointing to some energetic processes still going on beneath, and to the force, present still, but hidden. The volumes of carbonic acid gas rising from a fissure in the well-known Grotta del Cane, are very decided witnesses of some inward calcining process at work. It is highly instructive to walk from this crater-lake to the crater of Solfatara. The path lies among vineyards planted in the white powdery soil till near the outer edge of the crater. On all sides are deep stream-courses cut out sharply in the soft white felspathic ash, and every section on ascending shows the hill-side to be made up of beds of the same fine crumbling ash, some of it in very thin layers, and dipping markedly outwards. It is important to notice the great regularity and fineness of bedding of some of these ash-beds, which in any other situation would at once be put down as clearly evidencing their stratification beneath water;

* Probably by this time the draining operations are completed.

but in this case the ash ejected, while somtimes coarse and scoriaceous, has at other times been very fine in texture, and probably saturated with water, thus forming a semi-fluid paste. That this has been the case, is rendered additionally evident by the fact of the impressions of leaves and grasses being perfectly well preserved in it, even to the delicate tracery of the leaf-veins.

The crater-edge gained, its interior must at once strike the observer: a white plain, smooth in some parts, covered with pits and hollows in others, surrounded by white crater-walls clothed in places with green shrubs, and having many a column of red-tinged vapour rising from small, half-hidden holes or gloomy-looking cavernous hollows. From one of these latter in particular there rise large quantities of aqueous vapour and sulphuretted hydrogen gas, and so great is the heat thrown out that the hand merely approached to the opening becomes at once severely scorched. The action of these gases upon the trachytic tuff around is to produce in abundance sulphate of alumina, which is washed down by the rains into the central plain, and to separate sulphur which is deposited within the rocky crevices, while at the same time other sulphates are produced in smaller quantities.

An eruption from this crater took place in 1198, and a lava-current flowed from its southern edge, finding its way into the sea, where it now forms the promontory of Olibano.* It is a very hard, grey trachytic rock, and probably was but imperfectly fluid. As Mr. Scrope has pointed out, it seems evident, from the way in which the lava overhangs the crater, that this last must have had a good blowing-out or clearing of itself after its protrusion, which is indeed evidenced by the loose scoriæ covering the lava-flow in places. The whole aspect of this volcano, which, on account of the gaseous fumaroles, may still be considered active, may well entitle it to the ancient Greek appellation of "Vulcan's Assembly-room."

From the Solfatara the beautiful Bay of Baiæ is well seen in all its soft luxuriance; on the one side, just below, stands Pozzuoli, the Puteoli and Dicæarchia of the ancients; on the other, with the promontory of Misenum and its hills jutting out far beyond, are the remains of the once magnificent but dissolute Baiæ; while the whole coast-line is strewn with ruins, many now partly submerged, of the houses of Roman senators and poets, of temples, and of baths; and Monte Nuovo, with its soft outline, an infant in age as compared with Cicero's Villa hard by, seems like some deity newly risen to watch over the shades of departed Roman greatness.

Descending from the western side of the Solfatara, and passing on the way, at some little distance, the very perfect ruins of the amphitheatre of Puteoli,—where Nero himself on one occasion made a show of his prowess in the arena,—the sea-shore is reached. Here a narrow strip of flat land extends between the sea and what have formerly been sea-cliffs, from Pozzuoli to near Monte Nuovo. Close to the former place, though much obscured by surrounding houses, stands the well-known temple, so called, of Jupiter Serapis, whose three massive columns have acquired such a geological importance on account of the changes of level they reveal, evidencing as they do a depression of the coast within the Christian era of some 16 feet, its re-elevation to probably a somewhat greater height, and its slow subsidence within quite recent times; so that now the sea-level stands just at the base of the columns.*

A short walk along the flat plain just mentioned, and then for some little way by the sea-shore, beneath low cliffs formed of horizontal beds of ash, deposited beneath the sea at an early period of volcanic activity and before the existing land-cones were formed, brings us to the foot of Monte Nuovo. At this point the sea-cliff presents an unconformable section, nearly horizontal beds of stratified sandy ash being overlapped by other beds, which include near the cliff-top a thin, irregular flow of black lava. Monte Nuovo is a notable example of what volcanic force can effect within a short time, for previously to the 29th of September, 1538, this spot was part of a level plain, and the site of the village of Tripergola, while on the third day after this date it was occupied by a volcanic mountain 440 ft. high, and 1½ miles in circumference, the whole mass consisting of ash and scoriæ, much of it pumiceous, thrown out from, and falling round, a central vent. No lava-beds, with the exception of little runs a foot or two in thickness (as noted above), seem to have been produced. The eruption was preceded by the elevation of the long strip of plain land already described, together with the temple of Jupiter Serapis, and for some time previously most violent earthquakes alarmed the inhabitants of the neighbourhood. So great was the quantity of muddy ashes and scoriæ ejected, and to such a height were they thrown, that "not only Pozzuoli and the neighbouring country were full of this mud, but the city of Naples also, the beauty of whose palaces was, in a great measure, spoiled by it. The ashes were carried as far as Calabria by the force of the winds, burning up in their passage the grass and high trees, many of which were borne down by the weight of them."† At present the crater is nearly as deep as the mountain is high above the sea-level, its sides

* Scrope thinks that this lava-stream may probably be due to an earlier eruption.—See "Volcanoes," p. 321.

* See Lyell's "Principles" for full accounts of this interesting subject. Also Phillips's "Vesuvius," and Murray's "Handbook for Naples."

† Account by Pietro Giacomo di Toledo.

sloping steeply on to a small flat plain, now a cultivated field, at the bottom.

From the highest point of the crater-edge, on the east, a fine view is obtained towards Pozzuoli and Vesuvius, the top of which appears above the Solfatara, while immediately below is the old line of sea-cliff and the strip of level land upheaved at the time of the formation of Monte Nuovo. From the crater-edge on the west a view is obtained of Lake Avernus, with its crater-walls, and of the volcanic mountains of Ischia beyond.

A piece of plain country, covered with vines and famed for the first victory of the Romans over the Samnites, separates Monte Nuovo from Monte Barbaro, a lofty volcanic mountain, its outer sides covered with vineyards, and having a deep crater of an oval form about three miles and a half in circumference, the inner slopes clad with wood and the inclosed plain rich with cultivation. Here again no lava-flows are to be seen, but on every hand beds of pumice-tuff with the usual outward dip, though the ash is somewhat harder than that of some of its neighbours. The eastern end of the crater seems to have been partially destroyed, perhaps by the opening out of a neighbouring vent, and here sections are disclosed showing an inward dip of some of the ash-beds. Now in the case of a cone formed by ejections round a central orifice, those materials which fall back within the crater will have an inward dip, or towards the orifice, while those falling outside will have an outward dip. The former will have less chance of preservation than the latter, since a volcano in action is continually blowing or clearing out its crater by sudden outbursts. To most minds the sight of outwardly-dipping beds, formed of material which at some time must have been ejected, lying at the angles of repose for such material, and arranged round a central orifice which had the power of ejecting vast quantities of ash and scoriæ, is sufficient evidence that the cone is one of *eruption*, and not of *elevation* or upheaval of originally flat beds round a central orifice in a dome-shaped fashion; but if there is the additional evidence of some of the inwardly-dipping beds likewise, then assurance is made doubly sure. In the case of a small part of the eastern side of Monte Barbaro, it would seem as if most of the outwardly-dipping beds had been destroyed, and those having the inward slope in great measure left.*

On a line with this last mountain, but farther to the east, is the perfect crater of Astroni, four miles in circuit and full of most luxuriant wood. Its crater-walls present the same appearance, and are formed of similar materials, to those of the other volcanic mountains, and no sheets of lava seem intermingled with the ash. About the centre of the northern side strata with an inward dip are seen among the trees; a similar dip is to be seen near the entrance, caused, however, in this case by a large landslip. In the centre of the crater are bosses of a trachytic lava, which probably possessed very imperfect fluidity, and, as suggested by Mr. Scrope, very likely formed the last phase in the eruption. It is certainly quite inconsistent to regard this as a crater of elevation (round the central bosses) and the other neighbouring ones as craters of eruption; and a thorough examination of such a district as that of Naples, unbiassed by pre-conceived notions, will lead inevitably to the conclusion that here at any rate exist only craters of eruption, and tend to diminish faith in even the existence of elevation craters at all.*

The special points then to be gleaned from this slight glance at the volcanoes of the Phlegræan Fields are:—

1. The general evidence they afford of being purely volcanoes of eruption.
2. The great scarcity of lava-flows.
3. The trachytic nature of all the ashes, and of the lavas of the Solfatara.
4. The state of the ejected material; as fine muddy ash often finely laminated, or dry ash and scoriæ.

Vesuvius.—This, as is well known, is a double mountain, the old Monte Somma, and the recent Vesuvius proper. That part of Monte Somma now remaining is but a portion of the old crater-walls, the south-west side having been blown away. Within the centre of this old crater-line stands the modern cone of Vesuvius, a deep trough called the Atrio del Cavallo separating it from Monte Somma. Previously to A.D. 79, Monte Somma presented the form of a large truncated cone, its sides clothed with vegetation, and with more or less of a plain at the summit. In the year 79 occurred that notable eruption which, blowing great part of the old mountain away, overwhelmed Pompeii with ashes and Herculaneum with torrents of ash-mud, and since that period its activity has never entirely ceased, and the modern cone of Vesuvius with a central crater has grown up so as even to overtop the highest point of Somma.

That Monte Somma was a cone of eruption is clearly seen by examination of the outwardly-dipping beds of lava and ash in the cliffs above the Atrio del Cavallo, these beds being pierced by dykes running in various directions, which were the

* An objection to evidence derived from *inward dip* in this case may be urged thus. The destruction of the outwardly-dipping beds, if caused by the opening out of a neighbouring vent, may have tilted the beds inwardly. I do not, however, think that it is so in this case.

* It is certainly much to be deplored that in such a generally excellent work as Murray's "Handbook for Naples," the old crater-elevation theory of Von Buch should be adhered to in some instances so persistently.

old feeders of lava-streams. That the modern cone of Vesuvius is one formed merely by eruption admits of no doubt whatever. In the eruption of 79 no lava seems to have been emitted, at least none is recorded, and the immense quantities of ashes, sufficient completely to bury and hide away cities for many centuries, have very much the aspect of the tuff-beds of the Phlegræan Fields.

The earlier records of the state of Vesuvius are necessarily very imperfect, nevertheless a rough history of the mountain, from A.D. 79, forwards, has been made out. From this it appears that the next *grand* eruption occurred in 1631; in the previous centuries eruptions are chronicled as having taken place from time to time, with considerable intervals between, but none of any magnitude, and Braccini describes the crater in the 17th century as overgrown with trees and shrubs and the abode of wild boars. The eruption of 1631 gave vent to several large streams of lava (green lines on map) which overwhelmed in a great measure Torre del Greco, Resina, and Portici, killing 18,000 persons; while the immense columns of vapour and ash spread terror and destruction on every side.

From this time forwards the eruptions have been numerous and severe, keeping the inhabitants of the sea-coasts below in a state of continual excitement. That of 1779 was very remarkable, on account of a vast column of liquid fire shot up fully 10,000 ft., shedding a most brilliant light for miles around; and the ashes fell in such quantities as to threaten the speedy burial of many neighbouring towns, and were spread throughout a distance of 100 miles.

A fourth *grand* eruption occurred in 1794, when a fissure some 3,000 ft. long was produced on the western flank of the mountain, and a series of small cones, from which proceeded lava-streams that overwhelmed great part of Torre del Greco and entered the sea. Great discharges of vapour and ashes followed, which deluged that country with volcanic mud.

The years 1822 and 1834 were signalized by powerful eruptions, that of the former producing large streams of lava flowing towards Resina, Torre del Greco, and Bosco Reale, and being accompanied by great quantities of grey and black ash; that of the latter giving rise to a wide current, which destroyed 496 houses out of 500 in the village of Caposecchi.

In 1850 the crater-walls were broken down, and lava flowed southwards and enveloped Bosco Reale.

In 1855, from a fissure on the north side of the cone, proceeded a stream of lava of great fluidity, which, passing on the north side of the ridge of Salvatore, reached very nearly to La Cercola, while a narrow branch ran off towards S. Giorgio. From three little craters in the north side of the cone, lava was ejected in 1858, some of which, after flowing first into the Atrio del Cavallo, then turned towards the Hermitage, and a large stream ran towards Resina.

In 1861 eleven little cones were produced only 700 yards behind Torre del Greco, clouds of ashes and great earthquakes accompanying their production.

In 1867 short currents flowed to the south-east and towards the Hermitage, while in 1868 a stream flowed to the north of the Salvatore ridge, threatening Massa di Somma. The eruption of the past year is so fresh in the memory of all, that no details are called for here.

On ascending the mountain from Resina,* after having passed through the vineyards clothing the lower slopes, the great uneven current of 1858 is encountered, a rolling sea of black lava with many a cavernous hollow. What, however, most strikes one is its ropy structure, many parts looking as if innumerable coils of tarred rope had been thrown in different directions. The curve of the ropy masses indicates the direction of the flow. The upper surface is completely vesicular and slag-like, but the inner parts are hard and compact.

After a passage for some time over this 1858 lava, the ridge of San Salvatore is reached. Here stand the Hermitage and the modern Observatory, upon a green grassy island amidst a sea of encircling black and rugged lava. Here, too, may be seen old ash-beds very similar to those of the Phlegræan Fields, and probably of the age of the destruction of Pompeii. Immediately to the south of the ridge is the mass of twisted and tarred ropes and ruptured blocks just passed over; to the north are seen the currents 1855 and 1868, presenting for the most part quite a different appearance, having but little of the ropy structure and more the semblance of an accumulation of loose blocks from a foundry, the surface lava having evidently rolled over itself in a hurly-burly fashion. This difference of surface-structure is connected with the relative rates of flowing of the streams. The current of 1855 may be traced down the great valley just north of the ridge, to where it forked, one branch running nearly to La Cercola, the other towards S. Giorgio.

On leaving the Salvatore, a section should be noticed of one of the old lava-beds of Somma with overlying ashes, this being in the line of the old crater-walls destroyed along the western side in the eruption of 79. Close by is the current of 1867, with a rugged blocky structure at the surface. A further walk of half an hour brings us fairly into the Atrio del Cavallo, the valley separating the modern cone of Vesuvius from the ancient Somma. The structure of the cliffs of Somma may here be well seen, beds of lava and ash dipping outwards and cut through by numerous dykes, some per-

* My ascent was made in May, 1870.

pendicular, others more or less horizontal, and intersecting one another at all possible angles.

From the Atrio upwards the really hard climbing begins, up the steep cone, with its loose blocks of scoriæ and lava intermingled with fine loose ash. When the summit is nearly gained, the topmost part has from a little distance the appearance of soft bright green grass, which a closer inspection, however, proves to be sulphur and its compounds, all smoking away like a huge dunghill.

All around is spread a magnificent prospect. Immediately below lies the Atrio, just above which may be clearly seen the three small craters which gave rise to the lava of 1858; the current itself may be traced running from them against the walls of Somma, then turning to the west, in which direction it is hidden for some short distance by the more recent flows of 1867 and 1868, and again appearing with its ropy structure, south of the Salvatore ridge; shorter currents from the same craters are also seen running eastwards, farther into the Atrio. Beyond, frown the steep and lofty cliffs of Somma, a little to the west is the ridge of San Salvatore, a fragment of old Somma, standing up amid black lava-flows (1855 and 1868 on the north, and 1767, 1858, and 1867 on the south). Farther off lie, the plain, with scattered towns and villages, surrounded by green vineyards, the beautiful bays of Naples and Baiæ, the islands of Ischia and Procida, the old volcanic mountains of the Phlegræan Fields; and farther off still, bounding the fertile plain and marking an old sea-coast, are the higher mountains beyond Capua and the snowy Apennines. Turning from this magnificent prospect, the crater-edge is gained: the sides are seen to slope steeply inwards, but the volumes of smoke constantly passing upwards hide the structure of the interior, except for momentary glimpses. Leaving the edge of this great smoking caldron, some small holes attract attention, holes not more than a yard or so wide, but of unknown depth, up which is constantly ascending a powerful current of hot air, so that fine sand or fragments of paper thrown in are at once blown forcibly out.

Passing round the edge of the crater, a view to the south is obtained; the plain on which Pompeii stood lies directly below, bounded by the mountains behind Castellamare, again forming the boundary of the old sea before mentioned. Across the blue waters of the bay the hills behind Sorrento and the island of Capri please the eye by their soft outline and delicate tint, while black lava-flows form a well-contrasted foreground. On the south-east side another flow of the 1867 lava can be traced; while those of 1850 and 1834 run also to the south or south-east, and, far below, the red craters of 1760 are conspicuous. Having about completed the circuit of the crater, the descent upon the south-west side is very instructive. The first part is made very rapidly, plunging up to the knees in fine black ash (which near the summit is quite hot below the surface), accumulated about and among the lava-flows of 1834, &c. In this easy manner about half the height of the mountain is descended in a very short time. The ash is for the most part very fine, and on examination is found to contain many separate crystals of leucite and augite. The several little red craters of 1794 are now reached; small model craters, at present very shallow, all close together, and one of them double; the birthplace of the lava-stream which destroyed Torre del Greco and ran far out into the sea. Just above these might be observed the sudden termination of a much more recent stream, presenting the appearance of a low line of steep cliff; and far below, only just above Torre del Greco, may be noticed the eleven little craters opened out along a straight line in 1861, and which again threatened the town with destruction.

Soon after leaving the craters of 1794, the region of vineyards is once more gained, not before passing, however, signs of their former higher extension, in the shape of ruined huts enveloped in lava yet not overthrown. Sometimes a wall of lava may be seen approaching within a foot or so of a hut, which it may partly surround, yet not overthrow. It seems that such an elastic resisting cushion of hot air is entrapped between the hut walls and the lava, as to resist the progress of the latter for some time, though finally it usually curls over the summit of the dwelling and envelopes all.

As regards the character of the Vesuvian products, both lava and ashes, a good deal of variety is exhibited. There are the trachytic tuffs of earlier eruptions associated with leucitic lavas or greystones; there are basalts of modern eruptions, crystals of augite in a dark matrix; and there are modern leucitic lavas. So that we have the three classes of volcanic rocks represented. 1st. Trachytic, essentially felspathic. 2nd. Basaltic (Doleritic), mixture of felspar and augite, the latter predominating: the augite is often crystallized out in a compact base, formed of mingled felspathic and augitic matter. 3rd. Greystones, an intermediate class formed of felspar (or one of its varieties) and augite: in the greystones of Vesuvius leucite takes the place of felspar, and is frequently crystallized out in a dark augitic base. J. CLIFTON WARD.

WOOD-BORING INSECTS.—There is nothing perhaps in nature more wonderful than the sudden appearance and disappearance of these minor works of the Creator, which are at his command called forth to answer ends that our limited understandings cannot comprehend, and which, being accomplished, are, by a combination of circumstances no less wonderful, swept away from us altogether for a season.—*Curtis*, "*British Entomology.*"

STRANGE HABITATS OF CERTAIN SPECIES OF DIATOMACEÆ.

THE ubiquity of the lower forms of life, both vegetable and animal, constantly attracts the attention of the natural-history student. The only preventive to the production and growth of organized forms appears to be the absence of moisture. In the boiling springs of Iceland, and in the snow of the Arctic region, may be found microscopic evidences of life. Nay, even in the acrid brine-pans of Cheshire these simple forms "live, move, and have their being."

The Diatomaceæ, like other low forms of life, are almost invariably present wherever moisture occurs, as among the roots of mosses growing in humid situations, or among the confervoid growths so frequently seen on stones or walls exposed to

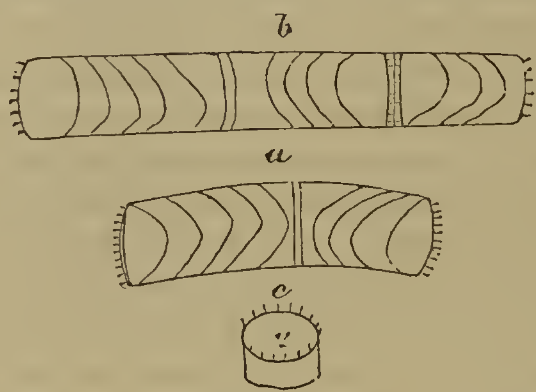

Fig. 133. *Liparogyra dentroteres: a*, arcuate frustule; *b*, straight filament; *c*, valve.

spray from a fountain or the drip of a gutter. Among the roots of mosses many species of Diatoms seem to luxuriate, and one of the most remarkable is *Liparogyra dentroteres*, Ehr.; *Orthosira mirabilis*, Gregory ("Trans. Mic. Soc.," vol. iv. p. 37). Frustules with spiral band, vitreous, sometimes slightly bent; valve discoid, with three or more obscure central puncta; margin set with short spines. (Washings from moss growing on alders, Heigham, Norfolk, F. K.; in moss from roof of cottage, Penzance, Ralfs; trunks of trees, Venezuela, Ehrenberg. Fig. 133: *a*, arcuate frustule; *b*, straight filament; *c*, valve.)

Ehrenberg describes two other species of the genus; viz., *L. circularis*, which seems to differ only from the preceding in the greater number of lines in the spiral (both forms were found in the Venezuela gathering), and *L. scalaris*, figured in the *Mikrogeologie*, and which I have reproduced, fig. 134 (South America). In moss taken from very wet localities I have occasionally found that very remarkable filamentous diatom *Orthosira Dickieii*. It does not occur in anything like the abundance in which it occurred in its original habitat, nor have I seen the sporangial (?) state of it in gatherings from other sources.

Orthosira Dickieii.—Frustules straight, cavities subspherical, valve discoid. Sporangial (?) frustule fusiform, with undulate margin (Cave near Aberdeen, Dr. Dickie; moss washings, Norfolk, F. Kitton. Fig. 135: *a*, sporangial frustule; *b*, ordinary frustules).

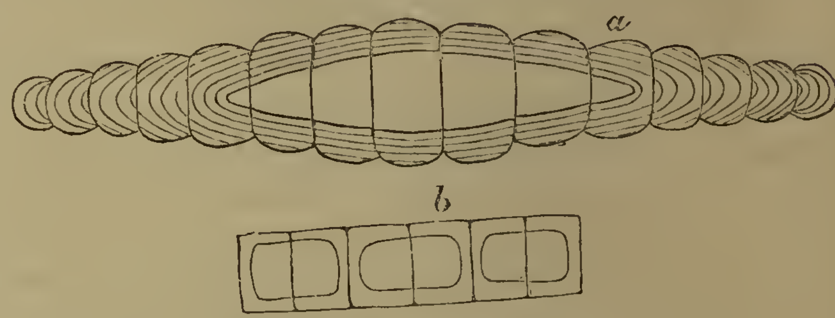

Fig. 135. *Orthosira Dickieii.*

Much obscurity exists as to the nature of the so-called sporangial frustule. Mr. Thwaites, in his description of this form ("Annals of Natural History," vol. i. pl. 12, 2nd series), seems to have no doubt of its sporangial nature. He thus describes its formation:—"At its commencement the endochrome, at the same time it withdraws from the end of the frustule, produces at its centre an additional ring of cell-membrane, and this process continues at certain intervals. The author of the 'Synopsis of British Diatomaceæ,' however, does not admit that it is a sporangial condition of the frustule, but considers it rather an abnormal development, analogous to what sometimes takes place in other genera. In no other members of this genus has there been found any analogous process in the formation of sporangia. Another difficulty arises from the mode in which self-division takes place in the sporangium, subsequent to its formation. It will be seen that after the formation of a number of concentric rings of silex, the sporangia assume an elongated fusiform shape, and upon the cessation of this ring development, an ordinary frustule makes its appearance, occupying the central portion of the fusiform body, but leaving the attenuated extremities unemployed.

Nitzschia vivax.—Frustule linear, valve linear, lanceolate, arcuate, apices produced, striæ distinct, 20 to 25 in ·001″. (Moss, Alder Carr, Heigham, Norfolk,—fig. 136.)

Fig. 134. *Liparogyra scalaris.*

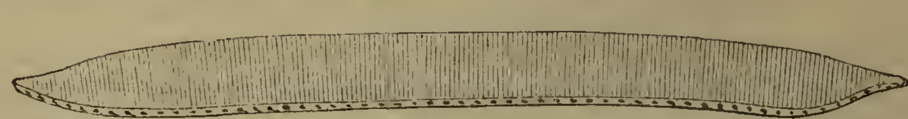

Fig. 136. *Nitzschia vivax.*

I had formerly doubts as to the identity of the moss form with the species usually found in brackish water, but a careful comparison has satisfied me that they are alike. On neither forms are the striæ so close as stated by Smith (30 in ·001″).

Another form almost invariably found in moss washing is *Pinnularia borealis:* although not peculiar to them, a few isolated valves may usually be found in the sub-peat deposits and recent freshwater gatherings. *Pinnularia borealis*, Ehr., valve linear, ends rounded, costæ distinct, about 13 in ·100″, not reaching median line, length of alve from ·0013″ to ·0025″; fig. 137, in moss washings from various localities.

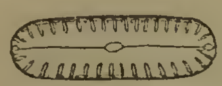

Fig. 137. *Pinnularia borealis.* Fig. 138. *Navicula undosa*, Ehr.

Dr. Schumann, in his "Die Diatomaceen der Hohen Tatra," figures this form with minute puncta on the entire surface of the valve. I have not, however, been able to detect any traces of them in my specimens.

Navicula undosa, Ehr.—Valve minute, oblong lanceolate, margins undulate (3 on each side), ends suddenly produced, striæ delicate, slightly radiant. (Moss washings, Norfolk, F. Kitton; in a deposit on a damp pavement, Edinburgh Castle, communicated by Dr. Arnott.) This elegant little species seems to have escaped the notice of Smith, Gregory, Greville, and other English Diatomists.

Norwich. F. KITTON.

THE PHILOSOPHY OF BOTANY.

THE following report of a lecture on the above subject, delivered before the members of the Manchester Literary Club, by Mr. J. E. Taylor, F.L.S., F.G.S., is extracted from the *Manchester City News* of the 16th August. We are glad to draw attention to this newspaper as one which gives a prominent place to scientific meetings, excursions, &c., thereby furnishing the numerous students of natural science in Manchester with a ready knowledge of what is going on in the neighbourhood:—

Mr. Taylor commenced by drawing attention to the fact that the materials out of which all plants were constructed differed little in kind from the similar ultimate materials which formed the basis of all animal life. Whatever it might be called, protoplasm or bioplasm, this identity was very suggestive. Another important fact was that the chemical elements entering into the composition of protoplasm were those marked by their unstable character. Out of the sixty or seventy elementary bodies known to chemists, there were none which were so speedily capable of entering into new combinations as those which formed the basis of animal and vegetable life. When this was considered with reference to the accumulation and exertion of force which characterized living beings, and especially animals, it seemed very remarkable. In the lower forms of animal and vegetable life, there was such an identity of construction that the best naturalists were puzzled as to which class certain species should be assigned. Hence it was that Haeckel, one of the best German naturalists, had established a third and intermediate kingdom betwixt the animal and vegetable, which should include all these intercalary forms. From these lowly conditions differentiation had gone on most rapidly among animals, whilst plants had been less capable of departing from a general type. In plants there needed no special organs to pump the nutritive fluids to every part, as was required in animals. Plants took advantage of chemical and physical laws to have distributed to their furthest extremity the nutritive fluid. Osmosis, proceeding from the most delicate fibrils of the root, capillary attraction carrying the juices or sap higher up the plant, in antagonism to the law of gravitation, diffusion and dialysis proceeding by means of the leaves, &c., and the mechanical swaying to and fro of branches and twigs by the motion of the wind—these were the chief agencies by means of which all such plants as were rooted in the earth had their nutriment diffused through their bulks. The conditions of growth operated more largely upon plants than upon animals; for, whilst animals had the power, more or less, of moving about in search of nutrition, the fixed condition of plants made them more dependent upon physical circumstances. It was true that plants contained in their structures much less nitrogen than animals possessed; and there was a reason for this. They had seen that plants were not called upon, owing to their dependency upon mechanical and chemical laws and their rooted condition, to exert anything like the force which was required by all animals, and especially by the higher forms; and as the principal force-giver was nitrogen, they could understand why it was that animals should possess so much nitrogenous material in their structures. But small though the quantity was, and differently proportioned in different groups of plants, it was the great reservoir whence the animal kingdom obtained its supply. Passing from the physiological structure of plants, Mr. Taylor next traced their morphology, or the laws which affected their shapes. This was shown to be largely dependent upon physical conditions. Taking the leaves of plants as an example, it was not difficult to prove that they were but deviations from a few simple primary forms, just as in crystallography all the thousands of known crystals could be referred to six elementary shapes. In the lifetime of many individual plants there would be found a series of modifications played on the shapes of the leaves, from the radical leaves to the floral leaves. It was a well-known fact that every plant could be separated into stem and leaves. The leaves were

but a continuation of the bark; the roots were but a continuation of the stem. Plants changed according to physical conditions, and this change was due to their power of adapting themselves to their conditions. Hence it was that we had annual, biennial, and perennial plants. Many of the former, when removed to other conditions, assumed the characters of the latter. Thus, the mignonette of our gardens became a woody shrub when taken to Algeria. This change was due simply to the materials of the plant falling from an unstable to a more stable condition, when woody tissue would be formed. It was possible to pass imperceptibly in the shapes of leaves from one extreme to the other. Taking ferns as an example, Mr. Taylor showed that when furnished with additional stimulants for growth, prolification ensued, and that when ferns did not possess sufficient nutriment, fronds became pinnated and pinnules became pinnatifid. In the case of the bramble, it would be found that the most luxuriant leaves were towards the bottom of the plant, and the smallest and simplest at the further extremity, where, of course, the nutritious materials were not so abundant. Flowers were but modified leaves, specialized for the act of reproduction. This specialization was the result of poverty of nutritious material, not of abundance. Hence it was that flowers were usually found at the terminal parts of plants. Leaf-buds could be transformed into flower-buds by the simple process of crippling, or preventing due nutrition, as every horticulturist was aware. When wild flowers were removed to gardens and more nutritious conditions, they frequently became monstrosities; that is to say, the floral organs had a tendency to be reconverted into foliar; this being due, first, to their being removed from the stiff "battle of life" with other plants, and their having rich soil, well weeded; thus being furnished with exactly the opposite elements that in the course of ages had resulted in the various types of the Phænogamia. The gorgeous colours of autumnal leaves were due to failing growth. The same cause might be assigned to the colours of flowers. This was undoubtedly the original cause of floral colour, and, in the ages of the past, natural selection had preserved it. The shapes of flowers were not difficult to understand. Their clustering was generally due to the elongation or suppression of the internodes,—the vertical spaces between the parts of the stem whence the leaves spring. Monstrosities of flowers, so called, were now included in a special science called *Teratology*, and it was found that the marvellous number of aberrations in form were assignable chiefly to excessive or defective nutrition. The *abnormal* conditions of growth in which certain orders of plants indulged were the *normal* conditions of other orders; and this suggestive fact, he thought, threw great light upon the ancestry of living forms. Referring to the aborted florets of some of the composite plants, Mr. Taylor showed the changes through which they must have passed, and how these modifications, studied in the light of the great antiquity of the earth, under the physical changes which have constantly been going on, could be understood. The geographical distribution of plants, the physico-geographical alterations that have resulted in their isolation and diffusion, and the antiquity of the various orders, were next referred to by the lecturer, who concluded by showing that it was impossible to understand our existing flora without taking into consideration the flora of every past epoch of our planet, of which the present was but the outcome and the climax. The lecture, which lasted over an hour, and of which the foregoing is only an outline, was illustrated by specimens of the various orders of plants, gathered in the gardens round the house on whose lawn the lecture was delivered.

THE SILVER-FIN.

(*Hypsilepis anolostanus*, Cope.)

By Charles C. Abbott, M.D.

If any one examines our various small fishes closely, collectively known to most people as "minnows," he or she cannot fail to detect many points of difference among them; and attention once drawn to them as they dart and glisten in every babbling brook, the observer will be sure to note with especial delight the beauty of form, brilliancy of colour, and graceful movements of the "Silver-fin."

Wherever there happens to be a projecting root of a tree, or prominent boulder in the bed of the stream, causing by its presence an extra whirl and current in the water, there a dozen or more of these quick-motioned fishes will be sure to congregate, now diving deeply down, and then as quickly leaping upward, even above the surface; darting at even passing insects, and ever and anon frightened at some real or imaginary danger, all disappearing in an instant, but only to return as quickly, and repeat their mad-cap movements in the sparkling water.

Their gambols are all as mad and meaningless as the giddy May-flies' sunset dances,—so, at least, we are apt to think; but is not this rather a too hasty judgment?—for we have yet to learn what impressions of the outside world they have, if it be possible, and *prove* their antics less rational than the wild capers of the rudest savage.

At all events, fishes are very far from being fools. Like animals higher up in the scale—even to the upper end of it,—they vary in the range of their intellectual capacities; but we have yet to see one that did not display some cunning, and often give good evidence of unquestionable thought.

The Silver-fin (*Leuciscus anolostanus*, No. 72 in Gunther's Catalogue, vol. vii. p. 256) is so called from the satin-white pigment which fills all the inferior fins and the tail. This peculiar colouring is not, however, as stated by several writers, peculiar to the spring and summer months. After a very careful examination of the colouring of all our fresh-water fishes, we have found that the difference between spring—or the breeding season—and other times of the year is not so great as frequently represented. The Silver-fin has this satin-white glistening of the lower fins somewhat brighter in summer than in winter; and so, too, with the gorgeous Red-fin (*Hypsilepis cornutus*) and the Chub (*Semotilus rhotheus*); but the bright colours are not lost in autumn and throughout the winter,—they are simply duller. The peculiar colour of the fins of the Silver-fin is not confined to the male fish, although in the allied *Hypsilepis cornutus* the female fish is much more plainly coloured.

This little cyprinoid is not at all confined to the smaller streams, such as where we have described him, but far out in the river, where the water is deepest and the current strong, there, too, in little companies they are often found, apparently well contented with their whereabouts, notwithstanding the voracious Rock-fish (*Roccus lineatus*) so frequently dashes in among them, to the certain destruction of some one of their number.

To juvenile anglers they afford excellent practice and good sport, if the mere pleasure of capturing them only is desired, as with a small hook baited with dough they may be taken as soon as the young fisherman becomes quick enough in his movements; for the little Silver-fins seize the hook and dart away as swiftly as the wary trout rises to the fly.

In one of the anatomical papers of Prof. Cope, on our Cyprinoids, we find a pleasing note on their habits,—a brightly blooming flower, as it were, in a dreary desert of dry bones; and with it, we will close our notice of the pretty Silver-fin. Prof. Cope writes:—"During the seventh month of the present year (1866), I watched a company of them (Silver-fins) with a greater number of the *Hybopsis procne* clearing out with pectoral fins and muzzle a sandy basin between two roots of a stump standing in the Conestoga Creek. They were excessively active, suddenly turning from their employment and sailing off in streaming columns, when the silver-white of the fins had a pleasing and peculiar effect in the evening light. As we approached, a *Tropidonotus sissedon* swam off with a luckless Hybopsis across his mouth, but soon returned to watch alternately ourselves and the busy throng. Approaching cautiously, he struck right and left below the surface, as the minnows passed him, but often fell short, till a hungry *Aromochelys odoratus*, having the haste and movements of a half-fed hog, came nosing his way into the midst of the unsuspecting party. They, of course, scattered in all directions, while he hastily explored the ground, and finding no eggs, scuttled off with the Wampum snake. The latter returned, and was successfully pursuing his fishing when we left."

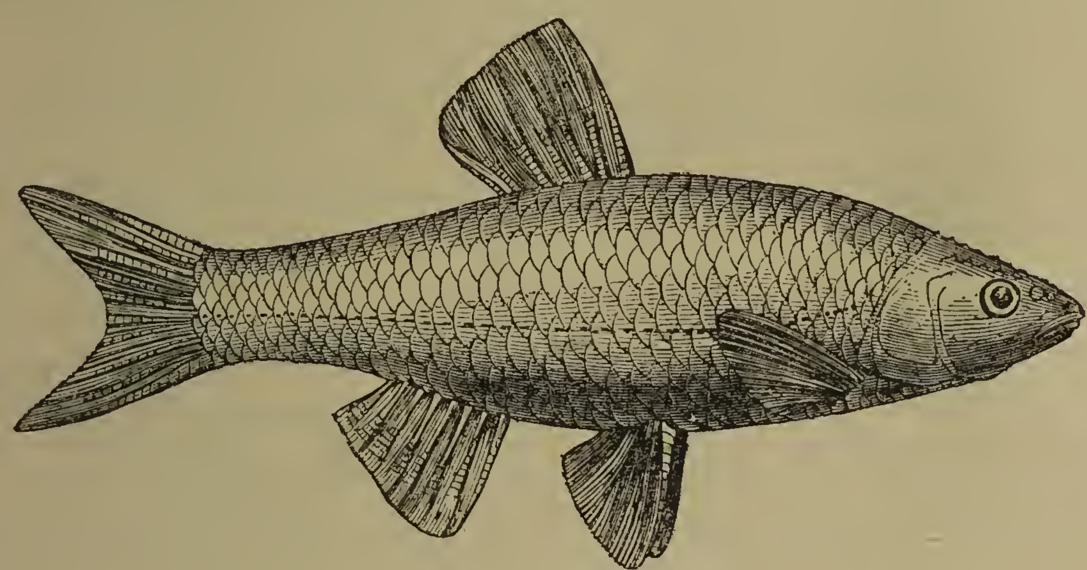

Fig. 139. Silver-Fin.

A NEW ERECTING-GLASS FOR THE MICROSCOPE.

MICROSCOPISTS, when they first begin to work, or even to use, the compound microscope, experience many difficulties and not a few disappointments, produced by the inverted image of the object; the apparent top being really the bottom, the right-hand side really the left, and *vice versâ*, causing so much perplexity as often to almost make the manipulator throw up his work in disgust. In time, with practice and patience, the hand becomes schooled to its work, and acts almost mechanically of itself, without appearing to be under the influence of the brain; or at least the hand appears to act without the brain attempting

to correct the false impression made upon the eye while following the motion of the hand; and thus the knife, camel-hair pencil, or bristle, is placed at once upon the particular portion of the object required, and moved about as desired. Having thus become used to work with the compound instrument and inverted image, I think I may safely affirm that the same difficulty is experienced when the erecting-glass and direct image are used. I must candidly admit that it is so with myself, for after using the compound instrument without an erector for the last twenty years, I am completely bothered when I have tried to use one; and even now, as I am using my instrument—with the erector I am about to describe—I have the greatest difficulty in placing the object in its proper position or in shifting it the right way for direct image, and no doubt many others find the same difficulties. Of course, all microscopists know that erecting-glasses, to fit in the body of the instrument, and erecting-prisms to fit over the ocular, are sold by opticians or supplied with the instrument; but I think that very few are aware that an equally good erector—in one respect, at least, superior—is within their reach, and that without any outlay or expense whatever. It is effected by placing an *objective inverted, over the ocular,*—or, in perhaps more simple language, placing an object-glass upside down over the eye-piece. I find that a ¼-inch (× 190) answers this purpose very well, but a ½-inch or ⅜-inch may be tried with advantage. I am writing this article at sea, and my best instrument and whole range of best object-glasses are at home, so I have only my working instrument and two powers—a combination of 1-inch, ½-inch, and ¼-inch—with me, and am unprepared to say from actual experiment what may be the best powers to use; but so far as I have experimented, I find that a low-power objective in the nose-piece of the instrument (an A ocular, and a ¼-inch objective over the ocular) to be about the best combination. The more so, as the superiority I claim for this erector, and to which I alluded before, consists in its acting as an amplifier, and also in allowing a little more working distance between the objective and the object itself. Having said thus much, it therefore remains for each interested reader to try the experiment for himself, and by using his various powers (changing the oculars may also be tried), by this means arrive at the best result to please himself or suit his own particular purpose. I am inclined to think that nothing lower than the ½-inch will succeed, though no doubt much will depend upon the performance of the objectives themselves.

To use this erector experimentally, the instrument must be placed in a vertical position, to insure the objective remaining balanced upon the top of the ocular; but if found suitable and intended to be adopted, an adapter may easily be made and fitted by almost any optician in any town, one end being made with the Society's universal screw for the objective to screw into, and at the other end a plain tube to fit on the ocular in place of the usual cap. I must confess that this erector has one disadvantage, viz., that, owing to its amplifying power, it increases the defects of both objective and ocular, if any exist, in a far higher degree than a high ocular increases the defects of an objective; but as I merely suggest its use for dissecting, mounting, or general manipulation, and not for original research, this failing, if it amounts to anything, is not of much importance.

In vol. vi. of the *Monthly Microscopical Journal,* page 46, I note the mention of an "achromatic erecting eye-piece," but having never seen one, or read even the description of one, I have no idea how they are constructed; and on looking through vol. v. of the same journal, I see (page 11) that Mr. S. J. McIntyre has used a 1-inch and 1½-inch object-glass between the objective and the ocular as a "searcher,"—much, I presume, on the same principle that Dr. Pigott's "aplanatic searcher" is applied; but I am quite ignorant whether either of their "searchers" gives an erect image or not. The employment of an objective as an erector in the way I have endeavoured to describe is quite an original and rather old idea of my own, but as nine-tenths of my time is passed upon the ocean, I am almost entirely shut out from knowing what is going on in the world of microscropic science, until I arrive home, and get my *Monthly Microscopic Journal,* SCIENCE-GOSSIP, &c., and then I have sometimes found that some of my ideas have been already anticipated.

Apropos of the ocean, I often think how entranced some of our "real" microscopists would be if they could only spend a week or two on board a ship in a calm tropical sea; the boundless treasures of exquisite marine forms of microscopic life found there, I really believe, surpass anything that can be imagined. The towing-net cannot be used for ten minutes, or even a bucketful of salt water drawn up, but it contains sufficient animal life to require at least a week to work out, and such forms as, I am sure, many of them, have never been figured or described. After having observed them under the instrument, the "thing of beauty" persistently refuses to "become a joy for ever," for I have tried nearly every known preservative to mount the object, but have never yet succeeded. A short time ago I caught two of those very beautiful forms, the *Porpita* (*Acalepha*, order *Cirrhigrada, Porpita gigantea*). Being desirous to preserve their very beautiful tentaculæ perfect, and also to keep their magnificent colour, I poured from time to time a drop of alcohol into the water in which they were (as recommended to kill the zoophytes with tentacles

expanded), but in a very short time the beautiful blue colour became a dull dirty Indian red, and all the tentaculæ an indescribable amorphous mass. Another very beautiful creature (microscopic) obtained in a dredging from Cascaes Bay, I was desirous of mounting, and intended doing so by allowing it to dry on the slip, and then balsam and cover it; but as there was a little dirt about it, and also being afraid of the crystals that would form when the sea-water evaporated, I added just a drop or two of pure filtered fresh water from a very fine and clean pipette, when. lo and behold! my "beauty" became instantly an unrecognizable mass. My next experiment will be to balsam the object right off, clean or not clean, crystals or no crystals; and the next, to try a saturated solution of chloride of sodium. I have also often been disappointed in my attempts to preserve the beautiful *Physàlia*, but I have hitherto found a weak solution of bichloride of mercury about the best thing. But if pure water alone materially changes the appearance of the delicate creatures, I am very much afraid that any media that will set up an irritating action will have the same effect: so here I must throw myself upon the scientific knowledge and kindness of your numerous readers and "Gossipers," and thus ask them for suggestions and hints as to a suitable preservative medium; though at the same time I feel more inclined to call in the aid of photography to my assistance, and with my small 4 × 4 microphotographic camera to "take their portraits right off." But here again I have my difficulties; for what would the motion of the ship, and more especially the vibration of the engines and the screw propeller, say to this photographic arrangement? I am much afraid that I should not get a "correct likeness."

And now to conclude my *gossip*, I must say that I shall look forward upon my return home for a few hints from some of the correspondents, as to a suitable preservative fluid, and I have no doubt that Major Holland, who has in some of the numbers of this journal so very ably described the contents of the towing-net and trawl, will be able to give me a hint or two.

Liverpool. JOHN A. PERRY.

A PAPER ON LIZARDS.

ON the 16th of May last, I bought in the Forest of Fontainebleau, a green lizard, and my friend J. C. another. They were very lively little creatures, and soon appeared to make themselves quite happy. I was in some difficulty as to the best means of bringing them home, but we finally bought a travelling birdcage, into which the little pets were put. I could not feed them, as I was not able to get them any flies, which the man we bought them of told us were their favourite food. As soon as they reached home, however, we gave them some, but noticed that they would not touch them if dead. We keep them in the greenhouse on account of the warmth, under a large bell-glass with a great piece broken out. They have a clump of grass and a stone to creep under, and seem quite at home.

I soon discovered that they ate spiders, and we gave them all we could find. The larger lizard, and the one that has the best and brightest green colour, is the more greedy, and usually gets the larger share. On seeing the insect, the lizard draws back its head like a snake, but does not attempt to touch it until it moves, when it immediately darts forward, and generally seizes the insect by its body, leaving the head protruding; the body is then apparently sucked in until it is swallowed at last with a great gulp. The operation is concluded by the lizard licking its lips like a dog after a savoury morsel, and looking as if he would like another. We tried them with various insects, and found that they will eat wood-lice, cockchafers, and black beetles; taking off the wing-cases of the two latter with great neatness. They will also eat the small green caterpillar that is found on gooseberry-bushes and rose-trees, but decline any other kind, just licking them once and then refusing to touch them again. (I noticed that the caterpillar seemed quite insensible for some time after the licking.) We now generally feed them with black beetles, giving them a spider or two as a treat now and then. One day they ate twelve beetles each, but they seldom get so many. I believe they will live for a long time without food, but I do not think we shall ever put them to the test. One of them laid two eggs on the 21st of June, about the size of a canary's egg, but not smooth, more like parchment; these were put on a tile with sand and placed near the glass of the greenhouse, trusting that they would hatch; but unfortunately they were wetted in watering the plants, and in a short time shrivelled up. So I fear we must give up all hopes of young ones this year.

The lizards are of different colours, one (the larger) being, as I said before, a bright emerald-green, the head having a blue shade, and the under side is a brilliant yellow. The other lizard is an olive-green, with yellow underneath. They measure twelve inches from the tip of the tail to the nose, their bodies being four inches long. They have no teeth and are quite harmless; one of them, if much disturbed, tries to bite, but can only give a small pinch.

A few days ago the smaller one hid itself completely under the grass in order to change its skin. I saw two large pieces lying on the sand, and have kept one. It has not any colour, and looks more like a stiffened piece of tissue-paper with a pattern on it than anything else I can think of.

I hope this account may be interesting to some of the readers of SCIENCE-GOSSIP who may be led to keep these little creatures, for they are really nice pets, and have the additional merit of being uncommon. H. F. M.

AUROCORISA, OR AIR-BUGS.

(*Heteroptera.*)

UPON reference to several works on Entomology, although a short description of this order is given,* I find no mention of the beautiful and complicated mechanism of the ovipositor saws of one of the species, *Stenocephalus agilis.* A rough sketch, therefore, of proboscis, lancets, and saws may not be without interest to the readers of SCIENCE-GOSSIP.

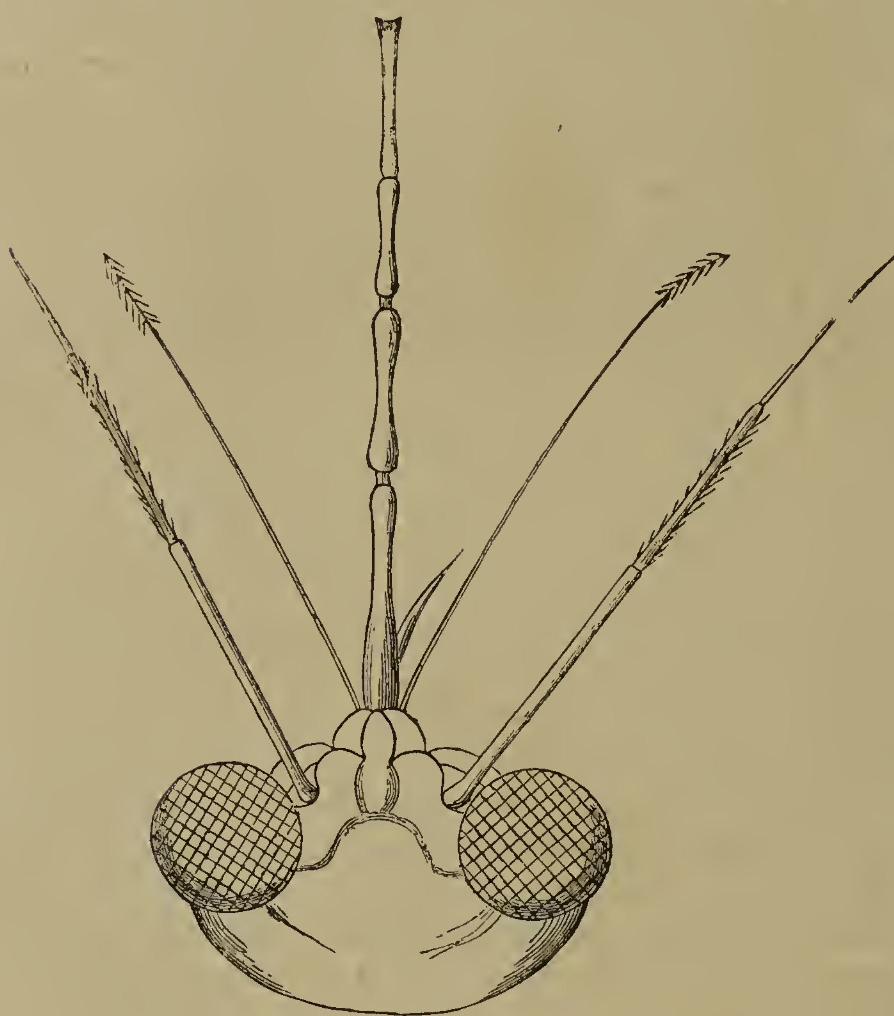

Fig. 140. Head, lancets, rostrum, and antennæ of *Stenocephalus agilis*, × 120.

The *Heteroptera*, or "different wings," include a large number of familiar insects (one not particularly interesting), the Bed-bug, Water-fleas, Water-scorpions, and Boatmen. In some species the wings are not developed, but those that are furnished with these appendages have the upper pairs larger than the under, lapping over when the insect is at rest. The basal part of them is hard and leathery, while the remainder is membranous and transparent. As a rule, the body is always flat, and the mouth is furnished with a rostrum and two delicate arrow-headed lancets, which start from the under surface of the head, but from the front, and not the back.

The pupa is active, resembling the adult insect in appearance, minus wings. The Heteroptera are divided into two great sections,—the *Hydrocorisa*, Water-bugs, and *Geocorisa*, or Land-bugs. The one under consideration belongs to the latter group, and is named *Stenocephalus agilis*, the generic name being derived from two Greek words, signifying "short-headed." The colour of this insect is pale brown, with minute red spots on each shoulder; legs and antennæ are yellow, each joint having a black tip: the specific name *agilis* is given to it on account of its remarkable activity both on foot and wing, and its love of running about in the hottest sunshine. The chief point consists in the beak, or proboscis: this instrument is either three or four jointed, the latter being the number in the insect now-

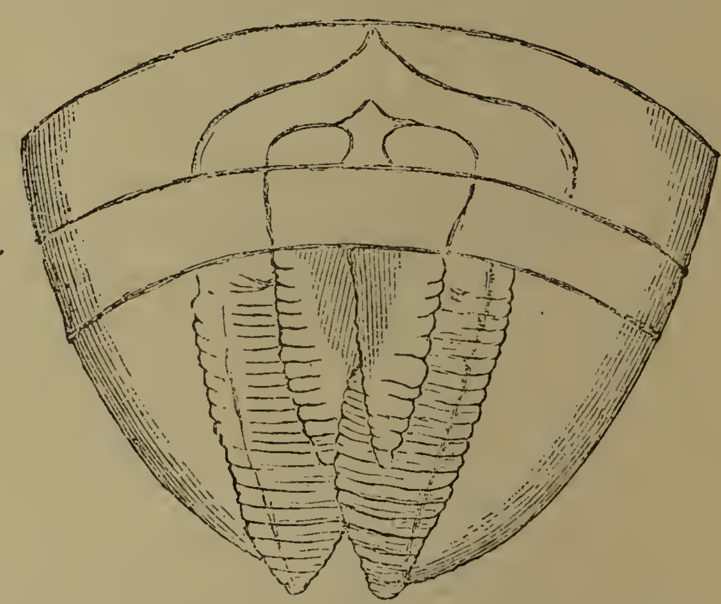

Fig. 141. Terminal segment of abdomen of *Stenocephalus agilis*, showing ovipositor-saws in natural position, × 120.

under consideration. In addition to the rostrum, are two arrow-headed and denticulated lancets resembling those of the larva of the Cuckoo-spit (*Aphrophora spumaria*). The ovipositor-saws are four in number, parallel to each other; their edges are finely serrated, and notched, not unlike those of the Tenthredo, but not so elongated.

I am rather surprised the existence of this implement has not been mentioned by authors on Entomology. My description is brief, and, I have no doubt, faulty; my aim is to stimulate others to further research of these interesting organs (ovipositors).

The multiplicity of things in nature is worthy of our greatest admiration and research. To every man Nature presents a thousand charms; at every step she delights him with new wonders, she invites him by microscopic and other inquiries to acquaintance; and well is he rewarded who obeys her call. The votary of Nature deems no object, however minute, unworthy of examination, none destitute of interest; nor does the spirit of philosophic inquiry

* "Insects at Home," Rev. J. G. Wood.

suffer him to rest satisfied with a casual glance at the multitudinal phenomena around him. He is not content merely to wonder and admire, but, urged onwards, he attempts to trace back effects to their causes; he investigates and combines, and, still proceeding on his course, endeavours to obtain a glimpse (however imperfect it may be) of the mighty plan of the [Creator, a knowledge of the grand scheme by which the whole is blended into unity: the result is an accumulated mass of riches.

J. O. Harper.

Many such preparations appear, at first sight, extremely complex, and are far less interesting than they would otherwise be on account of their being but little understood.

They are, however, exceedingly instructive, and exemplify some of the most important laws in organic nature; and are, moreover, especially interesting to the systematic naturalist who devotes himself more exclusively to the study of insects.

However remarkable the modifications exhibited in the mouths of different insects, their parts may

Fig. 142. *a*, The Maxilla and Labrum of a Carpenter-bee (*Xylophagus*), seen from beneath; *mx'*, great lobe of the maxilla; *mx^r*, small inner lobe; *mx^b*, basal lobe; *mx^p*, maxillary palpus; *car*, *cardines* or hinge; *lo*, lora or bridle; *lb*, labium; *lbp*, labial palpus; *pg*, paraglossa; *l*, ligula; *b*, tip of the tongue of the same; *c*, maxilla of a Rose-leaf-cutter; *d*, section of the blade of the same; *e*, rose-leaf cut by Leaf-cutter Bee.

ON THE STRUCTURE OF THE MOUTHS OF INSECTS.

A LARGE number of the most interesting specimens in the microscopist's cabinet are derived from the insect world, and a great proportion of these consists of the mouths and parts of the mouths of various kinds of insects.

always be referred, usually with the greatest certainty, to a type form, which is well exemplified in the mouth of a beetle. The remarkably complex suctorial organs of a bee or fly are merely modifications of this type, in which certain organs are very highly developed, whilst others are absent. There is no structure, even in the most complex mouth, which is not represented in the type.

The mouth of the great Stag Beetle will serve the beginner as an excellent starting-point, because the different organs are not only distinct, but they are comparatively very large, and may all be identified with an ordinary magnifying-glass, or even with the naked eye. When possible, it is always well to compare microscopic structures with those which are similar, and require no optical aid. Unfortunately this can seldom be done; but in the case before us no difficulty will occur in doing it.

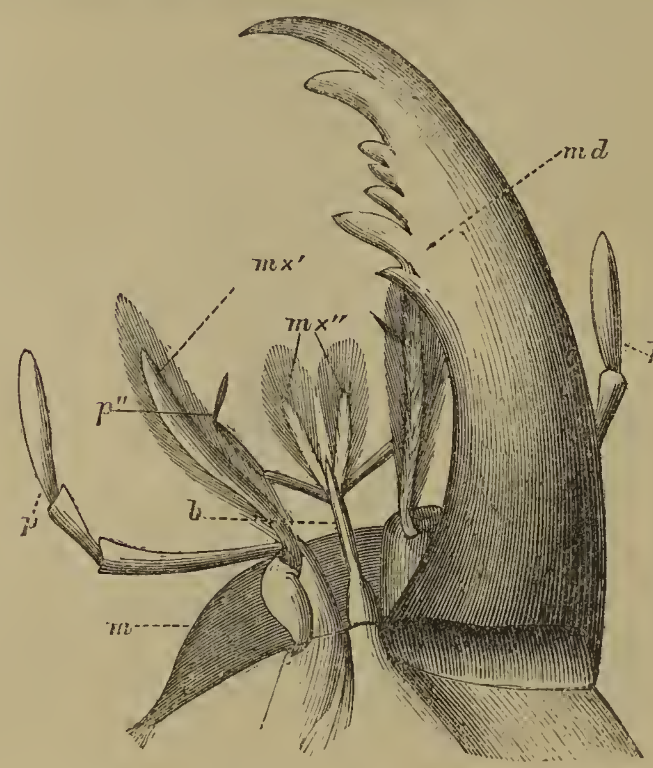

Fig. 143. A portion of the Mouth of a Stag Beetle, seen from above: the left mandible and the labrum are removed to show the labium. The references as in fig. 144.

If a longitudinal section be made vertically through the middle line of the head, each lateral half will exhibit the following parts. (These are seen in fig. 144.)

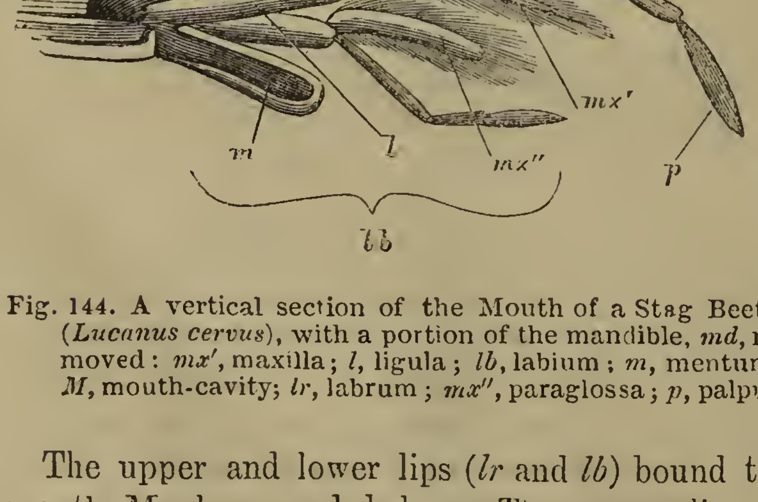

Fig. 144. A vertical section of the Mouth of a Stag Beetle (*Lucanus cervus*), with a portion of the mandible, *md*, removed: *mx'*, maxilla; *l*, ligula; *lb*, labium; *m*, mentum; *M*, mouth-cavity; *lr*, labrum; *mx''*, paraglossa; *p*, palpus.

The upper and lower lips (*lr* and *lb*) bound the mouth, M, above and below. The upper lip, or labrum (*lr*), is exceedingly simple, and forms a mere horny cover above the mouth: it is seen to be hollow and immovable.

The lower lip is more complex; its structure will be understood, however, by the comparison of figs. 143 and 144. It consists of a broad plate, *m*, called the mentum or chin: the mentum is similar to the labrum, but smaller. Above this the tongue or ligula, *l*, is seen, an insignificant organ in the Beetle, but one which attains the most marvellous development in the Bee. On either side of the ligula is a jointed and feathered appendage, the paraglossa, or tongue-sheath, *mx''*. The whole of these structures are usually included under the term labium, although the term is sometimes used for the paraglossæ, or tongue-sheaths, alone.

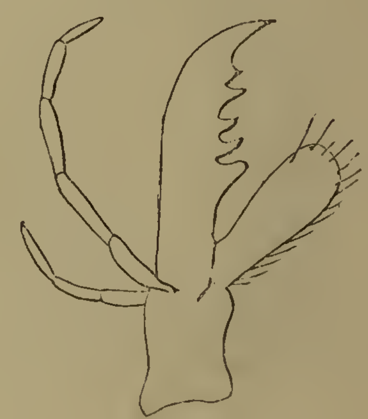

Fig. 145. The Mandible of a Predatory Beetle.

The great mandibles, *md*, or horns, as they are frequently called, flank the mouth. These are organs of prehension in many insects, in others they are used for bruising or gnawing. The Stag Beetle, for instance, bruises the bark of the young trees on which it feeds with these jaws or mandibles, and laps up the juice which exudes with its paraglossæ, or tongue-sheaths, *mx''*, as well as with a second pair of jointed fringed spoonlike organs, *mx'*, which are placed at the sides of the floor of the mouth to which they are hinged. They are called maxillæ, or jaws, and have a lateral motion, like the mandibles.

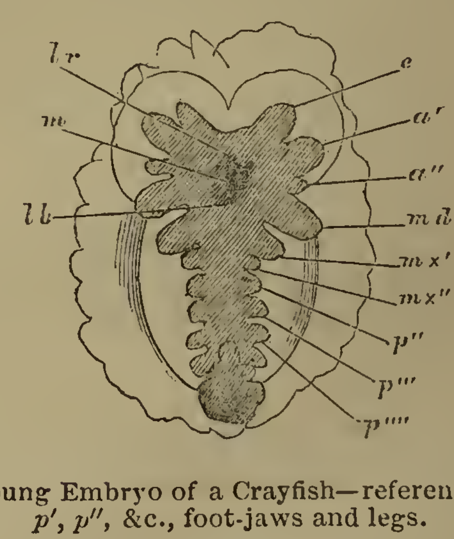

Fig. 146. Young Embryo of a Crayfish—references as above. *p'*, *p''*, &c., foot-jaws and legs.

It will be observed that all the lateral or paired organs have a horizontal plane of motion, and this is extremely characteristic of the jaws of insects, and, indeed, of all the Articulata, or those

animals which have a jointed external or cutaneous skeleton.

If instead of the mouth of a stag beetle we take that of a cockchafer, or better still, that of some predatory beetle, we shall find the maxilla (fig. 145) consists of two lobes, one of which is converted into a piercing or cutting instrument, whilst the other forms a soft tactile organ, like a lateral tongue, probably largely supplied with nerves of taste. The maxillæ are often sharper than the mandibles, but they are probably never equally powerful when mandibles exist. The paraglossæ are merely a modified second pair of maxillæ, and in crickets, grasshoppers, and cockroaches are exactly like the maxillæ.

All the lateral organs of the mouth have a similar origin, which they share with the limbs of the insect; hence they are frequently spoken of as modified legs. When the insect is very little developed, a number of exactly similar buds appear on either side of the middle line of the under side of the embryo: of these, some become converted into jaws, and others take the form of legs. Fig. 146 represents the young embryo of a crayfish, in which the process of development is precisely similar to that of an insect, as far at least as the formation of the jaws and limbs is concerned. Not only are the mouth-organs and legs developed in this manner, but the eyes and antennæ have a similar origin; hence the first three pairs of buds in the figure, marked e, a', and a'', represent the rudiments of the eyes and the two pairs of feelers, or antennæ, of the future crayfish. Those marked md, mx', and mx'' represent the mandibles and two pairs of maxillæ respectively, whilst those marked p', p'', p''', and p'''' are rudiments of legs. It is worthy of note that the three pairs of legs which follow the mouth-organs of the crayfish, lobster, crab, &c., are quite intermediate between jaws and legs, partaking equally of the characters of each: these are called foot-jaws. In insects there are no foot-jaws, but some authors think that the three pairs of legs which are constant in all perfect insects represent them.

The jointed organs, p' and p'' in the figures, are called palpi. The maxillæ and paraglossæ of all beetles have each one of these organs, and in some beetles there is a second palp on the maxillæ. The palpi are probably tasters; their hard external sheath is perforated by a vast number of exceedingly minute perforations, often amounting to several thousand, each of which leads into a delicate little internal sac, upon which a filament from the nerve terminates. Just as the surface of the tongue of man is extended by the existence of a great number of taste-papillæ, so the palpi of insects are extended by the formation of these little taste-sacs; so that the same result is attained under very different conditions.

Turning from the mouth of a beetle to that of a bee, we still find the same essential parts, but instead of the tongue or ligula remaining a comparatively insignificant organ, it becomes marvellously developed (fig. 142). It is no longer rigid, but consists of numerous joints moved by separate muscles. Its extremity is spoon-shaped, and the whole organ is densely covered with hairs, which are capable of being erected by special muscles or pressed flat upon the surface of the tongue. These hairs are of high importance, and aid materially, as will appear in the sequel, in raising the honey to the cavity of the mouth.

The paraglossæ appear quite rudimentary; but it must be remembered it is probably only their points which are seen as separate organs, the greater portion of them being frequently united to the mentum to form the base on which the great tongue rests. This is evident, because the palpi which really belong to the paraglossæ, or tongue-sheaths, then come from the back of the mentum, which is more correctly designated the labium, on account of its compound nature. The labial palpi, or those which properly belong to the paraglossæ, are organs of considerable importance: they serve at least as tongue-cleaners, affording the insect a ready means of clearing the hairs on the tongue, of pollen, whilst they probably possess considerable sensibility of a special kind, perhaps, enabling the bee to taste the nectar which it is about to lap into its mouth by the aid of its enormous tongue.

The labial palpi have also a third function, for they form a portion of the walls of a tube, chiefly composed of the maxillæ, which incloses the base of the tongue when in action.

The maxillæ are also very highly developed, as will be seen by a reference to the figure. Each consists of a large outer knife-shaped lobe, mx', strengthened by a prominent rib along its inner margin; of a small inner lobe, densely covered with sensory hairs, mx^r; of a basal sheath, mx^b; and a rudimentary palpus, mx^p.

The great outer lobes are of great importance. First, they form the roof the mouth-tube, the base of which consists of the mentum and labial palpi. The labrum completes the roof of this tube between the basal joints of the maxillæ only, the ridge-like edges of these organs being in close apposition, when the insect is feeding, in front of the labrum. A tube then is formed, in which the tongue lies, and from which it protrudes when it is extended to its full length. The tongue is capable of being entirely withdrawn into the tube, except its spoon-shaped extremity, which then lies between the terminal joints of the labial palpi.

The act of sucking takes place in the following manner. The bee presses the maxillæ, inclosing the other parts, to the base of the nectary of a flower in which the honey lies, and then extends its

tongue to its full length; thus dipping it deep into the nectar. The tongue is then withdrawn into the tube formed of the maxillæ and palpi, and during this act, as was first pointed out by Hermann Müller, the hairs are all erect, so that they sweep the honey well into the maxillary tube. As the tongue is again protruded, its hairs are pressed closely against it as it passes out of the end of the maxillary tube, whilst its inclosed portion retains the honey and sweeps it upward by a number of wave-like movements, in which the tongue-hairs are alternately erect or depressed, according to the direction in which the portion of the tongue on which they are placed is moving.

In this manner the honey is first lapped into the tube, and is then swept upwards by small wave-like movements of the base of the tongue, during which the hairs are erect upon those parts of the organ which are being withdrawn, and pressed down in those parts which are being extended.

In a healthy bee these movements are exceedingly rapid, but in one which is nearly torpid they are sometimes performed sufficiently slowly to be observed.

The maxillæ, however, serve another purpose; they are the tools with which the bee works; they act as knives and trowels. A remarkable modification of them is seen in the Roseleaf-cutter bee, the insect which cuts such marvellous circles out of the edges of the rose-leaves to hang as tapestry in its underground chambers (fig. 142, *c*, *d*, and *e*).

The edge of the much-curved maxillæ of this insect is set with fine-pointed teeth, like those of a saw: these are widely divergent, or widely set, as a carpenter would say, and prevent the locking of the blade in the soft rose-leaf.

Every mechanic who uses a saw knows that large wide-set teeth are best to cut through soft substances; and so in these admirably-adapted organs we find sharp-pointed but long, narrow, wide-set teeth. The maxillæ of the Roseleaf-cutter are even more perfect, for the sides of the blades are obliquely ridged, so that they not only cut along their edges but file the edges of the leaf smooth, with the surfaces of their sharp blades. Fig. 142*d* is an end view of a section of one of the maxillary lobes.

It must not be supposed, however, that bees have no mandibles: they possess these organs, one on either side of the mentum, although they are not represented in the figure. They are above the maxillæ, of course, and when they are brought into action the sensitive and complex maxillæ and labium are folded back under the head, the tongue being withdrawn by an S-shaped curve into the interior of the tubular mentum.

The mandibles are the tools for rough work: it is by them that the carpenter and mason bees dig or eat channels in wood, clay, or soft stone; it is with the mandibles that the honey-bee collects pollen and first shapes its waxen cell. The more delicate processes only are performed by the sharp, slender, and probably extremely sensitive maxillæ.

B. T. Lowne.

(*To be continued.*)

MICROSCOPY.

Crystals of Salicine.—In reply to "C. E. B.'s" inquiry in last month's Gossip, the easiest way to get salicine is to procure it at a pharmacy, but if he wishes to prepare it himself, he will find the following method answer.—Boil a sufficient quantity of willow bark (*Salix alba*) in water to form a strong decoction; pour off the liquid; add to it some lime recently slaked and mixed with a little water; let it stand for an hour, then filter through bibulous paper, and add some strong spirits of wine (alcohol) to separate any gummy vegetable matter; filter again, and evaporate with a gentle heat until crystals begin to form; then put a drop within a circle of gold size (the proper thickness). If the crystals that form are not good, redissolve and filter through animal charcoal, and recrystallize as before. —*Thomas Buck.*

How to mount Microscopic Fungi.—In reply to your correspondent E. L. Hull as to mounting microscopic fungi I beg to give the following information of my own mode of mounting. First, I mount the fungus as I find it on leaves or otherwise, on sheets of cartridge-paper, of royal octavo size, usually taking care to place a portion near the edge of the paper, so that the fungus can be examined *in situ* as an opaque microscopic object. Second, in some cases of *Æcidiaceæ* (Cluster-cups) and others I mount the fungus on the usual microscopic glass slides as opaque objects in dry cells of gutta-percha, or other suitable material. These are more convenient for reference than the octavo mountings. Third, the spores of fungi I mount in balsam, reduced with benzole, when they will bear the action of the chemicals; and when that action destroys the tissue or renders the spores too transparent, I use—Fourth, a composition of gelatine, which I buy at a shilling a bottle of Mr. Aylward, of Cotham-street, Strangways, Manchester. In this latter case (as also in No. 3) I soften the fungus in water and then cut a very thin section, or crush the fruit, *asci*, or otherwise, upon the slide; I examine the slide in the water, and if I find the *asci* or spores in good condition, I allow them to dry upon the slide, and when dry I, after softening the gelatine by heat, breathe upon the object and drop a small quantity of gelatine upon it, let it harden, give the necessary japan border, and the object is complete. The gelatine mixture I speak of preserves the most delicate

spores, and when thus mounted they will retain their character for an indefinite period. In all cases where the fungus will allow it, sections of the entire tissue should be cut: in this case the asci are seen in their natural position and the object is not only pleasing for its beauty as a microscopic object, but is a lesson in botanical physiology.—*T. Brittain, Manchester.*

MICROSCOPIC CRYSTALS IN SEEDS.—Referring to his engraving of the crystals in the testa of the Elm, given in the *Quarterly Journal of Microscopical Science*, July, 1873, and to other figures in SCIENCE-GOSSIP, May, 1873, Professor Gulliver, F.R.S., shows that similar crystals are constant in the testa or pericarp of many orders of plants, and yet never found in several other orders. These crystals he showed, at a late meeting of the East Kent Natural History Society, to be such beautiful microscopic objects as may well induce the many microscopists who are now examining the outer markings of seeds, to look a little deeper into their interior structure; and he regards this subject, though always ignored in our books of systematic botany, as intimately connected with the life-history and natural affinities of plants.

PARASITIC FUNGUS ON A MOUSE.—Professor Leidy recently exhibited a mouse at one of the meetings of the Academy of Sciences at Philadelphia, which had several whitish masses adhering to various parts of the head. When examined under the microscope, these white masses proved to be composed of sporular bodies, single, double, or in short chains of a dozen or more. Each measured about the 650th of a line in diameter. The fungus is a *Torula* or *Oïdium*, resembling that found in aphtha, and the *Monthly Microscopical Journal* suggests that the disease in the mouse may be the result of its having fed upon articles imbued with adherent portions of the aphthous matter from the mouths of the children in whose hospital ward the mouse had been caught.

MICROZYMAS OF MILK.—M. Bechamp has recently shown that to observe the microzymas of milk the latter should be diluted with five or six times its volume of creosoted water, and filtered. The filter will retain a certain quantity of insoluble matter, which should first be treated with ether to dissolve out the butter. Then, with a dilute solution of carbonate of soda to take out a little casein, and lastly with distilled water. Under a power of five hundred diameters, the microzymas may then be clearly distinguished. Milk drawn direct from a cow into apparatus specially arranged to exclude the air, and kept at a temperature of from thirty-five to forty degrees, was found to be curded on the third day. At the time that the coagulation becomes clearly perceptible, no organism except microzymas can be detected in the milk. M. Bechamp concludes that the fermentation which is set up, and produces lactic acid, acetic acid, and alcohol in milk curded under these circumstances, is due to the microzymas normally present in the milk.

MICROSCOPICAL PUBLICATIONS.—Dr. Donkin has recently issued Part III. of his "Natural History of the British Diatomaceæ," in which he is still figuring and describing the *Naviculas*. The plates accompanying this part are exquisitely finished. The third edition of the "Micrographic Dictionary" is proceeding, and we have received the parts up to XII., the word "Hydra." To all microscopists this new edition of the "Micrographic Diotionary" is invaluable. The letter-press and woodcuts, as well as the highly-finished plates, are great helps to the student.

CRYSTALS OF THE WILLOW. — I think there can be but little doubt as to salicine occurring naturally in a mixed state with other matter in the bark, &c., of the willow. In confirmation of this fact, we need scarcely look any further than the chemistry involved in the process, as given by "K." in last month's SCIENCE-GOSSIP for its extraction. The first part of the process, viz. the boiling of the bark with water, shows this, from its chemical characteristic, which decoction, when treated with sesquichloride of iron, is coloured dark green, and with strong sulphuric acid red; the former indicating the presence of tannin, which constitutes the astringent property of the willow, and the latter that of salicine. As to the subsequent part of the process, the employment of the oxide of lead is merely to remove from the solution gum, tannin, and extractive matter, which would otherwise impede the crystallization of the salicine; whilst the object of the sulphuric acid and sulphuret of barium is to decompose a salt probably formed through the combination of a portion of the lead with the salicine. Of willow bark, which is fresh and rich in salicine, Marck says that "it may be obtained by cautious evaporation from the cold aqueous infusion,"—again proving it to be a not improbable natural constituent of the plant. Salicine, if acted upon by a mixture of bichromate of potash and sulphuric acid, in certain quantities, gives rise to an essential oil—hydride of salicyl,—which in its chemical and physical properties is found to be identical to the oil of Meadow-sweet (*Spiræa ulmaria*).—*John Harrison.*

ZOOLOGY.

A RARE BEETLE.—It may interest some of the readers of SCIENCE-GOSSIP to know that a splendid specimen of the coleopterous tribe has been taken by Mr. Cowper, of South Kensington, in the

garden attached to the Museum. It was exhibited at the Kensington Entomological Society's meeting on Friday, 8th August, and was declared by Mr. H. P. Pascoe to be *Tropis dimidiata* of New Holland.—*W. H. Kennell, Kensington.*

A New Cirripede (*Scalpellum regium*).—Professor Wyville Thomson, in his notes from the *Challenger*, published in *Nature* for the 28th August, describes a new species of Scalpellum, which he has named *Scalpellum regium.* It was brought up by the dredge, five days from Bermuda, on the passage to the Azores, from the enormous depth of 2,850 fathoms (3 miles, 1 furlong, 200 yds.). This fine species, which is very far the largest known living species of the genus, measures in the adult female 60 mm., of which 40 mm. are occupied by the capitulum, and 20 mm. by the peduncle. It is most nearly allied to *S. ornatum.* In almost all the specimens procured, several of the parasitic males (see Science-Gossip, p. 199) were found attached within the occludent margins of the scuta, from five to nine of these males being found attached to each female. "Under the border of the mantle of one female there were the dead and withered remains of five males, and in most cases one or two of the males were fully developed; several appeared to be mature, and one or two were dead, empty, dark-coloured chitine sacks." Simple as is the structure of all these parasitic males, that of *Scalpellum regium* is described by Professor Thomson as the most simple yet observed. It is oval and sac-like, about 2 mm. in length, by 9 mm. in width, covered with fine chitinous hairs arranged in transverse rings; no œsophagus or stomach apparent, and the whole of the posterior two-thirds of the body in the mature specimens was filled with a lobulated mass of sperm cells. A more detailed description of this interesting capture is promised hereafter.—*T. S.*

Shore Lark.—It may be a matter of interest to some to be informed that last November, on Felixstowe beach, Suffolk, I shot a specimen of the rare bird *Alauda alpestris* (Shore Lark). This bird is a very rare visitor to our shores, and I understand that the specimen in my possession makes only the fifth which has been shot in England since 1830.—*W. E. B. de V. Mathew.*

Respiration of Fishes.—M. Quinquand has recently published a paper in the *Comptes Rendus*, on the relative amounts of oxygen absorbed by various species of fish under different conditions. He confirms the observations of Humboldt and Provençal, that there is a cutaneous respiration in fishes, but shows that this is very feeble.

Food of the Snake, &c.—In reply to a query of mine in the July number of Science-Gossip, as to whether the snake swallows toads as well as frogs, I have received two very interesting letters on that and kindred subjects from a Somersetshire clergyman, who has given me permission to publish some of his observations. He says: "I have never caught snakes in the act of doing so (*i.e.* swallowing toads), but I have several times seen them disgorge toads, in various stages of decomposition. I particularly remember one occasion, when more than a mile from home, I caught a snake, which I saw had very recently swallowed its prey. I took it home, and placing it on the lawn, began to tease it, with the intention of making it disgorge its meal. It immediately began to strain, and the protuberance in the body moved slowly towards the head, each strain advancing it a short distance. At length the jaws opened, and the body of a toad was gradually ejected. After remaining *in statu quo* for a few minutes, the toad showed some signs of life, and the limbs slowly regained their proper position. It wiped off the slime from its face and head, and then crept slowly away. I believe that the toad is the natural food of the snake, quite as much so as the frog; in fact, I have seen more toads than frogs disgorged by snakes. It has been only when teased as described above, that the snake has endeavoured to get rid of its prey, for the purpose, as I conclude, of enabling it to move more rapidly away." The same gentleman has likewise a little to say on the manner in which the toad disposes of his "old clo'":—"A few days ago I was fortunate enough to see the operations of a toad casting, or rather changing, its skin, and then swallowing it. I plainly saw the skin of both the fore-legs drawn off like a stocking and swallowed. The outer skin was perfectly dry, but the new skin was quite shining with moisture. The toad sucked, or rather snapped, in his skin as it does a worm, but there was no sign of mastication. The animal was so intent upon its occupation that it seemed to take no notice of the three faces that were peering down, not twelve inches from it."—*W. H. Warner.*

Bustard in Suffolk.—During August, a strange bird was seen on Wangford and Lakenheath Warrens, in Suffolk. It is described as being as large as a turkey, and of a rusty colour,—in fact, more like a turkey than anything else. When it flew, it was described as being a long time before it could raise itself from the ground. The bird was seen by two gentlemen, and subsequently by various agricultural labourers. There can be little doubt it was a specimen of the Great Bustard, returned to visit the former habitats of its ancestors, which were once tolerably numerous in this part of the country.

Habit of Pandora.—In a short note communicated to the *Annals and Magazine of Natural History* for September, Dr. J. E. Gray states that he has

often observed living specimens of *Pandora* lying in burrows of sand, but he could not get at its natural habitat. The shells were only washed up there by the tide; and if they did not get into their natural situations, they died, and would always be found with their valves gaping open.

BOTANY.

Manual of Botanic Terms.—We beg to call attention to the recently published second edition of this most valuable book. The author, Mr. M. C. Cooke, has evidently spared no pains to bring it up to the most recent botanical status. During the past ten ten years a great number of new botanical terms have come into use, and these the student will now find fully explained. Especially in those words necessarily required in dealing with monstrous vegetable forms (*Teratology*), will the reader feel thankful for so complete and time-saving a manual. We may add that the additional illustrations are numerous, and such as cannot fail to be acceptable to the student.

Local Names of Common Plants.—The following are the names in use at Sidbury, near Sidmouth, for some of the wild plants:—Summer-farewell, Ragwort; Willow-herd (large hairy), Wild Flox; St. John's-wort, Tipson; Red Campion, Robin Hood; Hemp-nettle, Wild Mint; Tansy, Mushroom; Bulrush, Lever's Daisy; Clyder, Clie; Eyebright, Peeweets; Hemp Agrimony, Comfrey; Dropwort, Lemp; Fleabane, Camels; Bindweed, Withy Wine; Mallow, Cheesenut; Coriander, Caxey; Snapdragon, Dog's-mouth; Ploughman's Spikenard, Michaelmas Daisy; Knapweed, Devil's-bit; Spear-thistle, Horse-thistle; Foxgloves, Peppes; Ox-eye Daisy, Horse Daisy; Black Bryony, Row-berries; Common Nipplewort, Hasty Rogers; Bird's-foot Trefoil, Tom Thumb; Persicaria, Lamb's-tongues; Crowfoot, Giltincup; Wild Camomile, Wild Camels.—*E. D. B.*

The Hollyhock Disease.—*Grevillea* states that during June and July this disease was reported from different localities in England, as having caused great damage to the Hollyhocks. It is caused by *Puccinia malvacearum* (Mont.), a fungus not previously observed in this country, which was originally described by Montague as occurring on the under surfaces of the leaves of *Althæa officinalis*. Specimens of *Malva sylvestris*, with this fungus parasitic upon them, have also been recorded from Salisbury, Chichester, and Exeter.

Lysimachia punctata.—During a walk near Norwich in the latter part of July last, I had the satisfaction of finding a specimen of *Lysimachia punctata* under such circumstances as to prevent the supposition of it being an escape. Seeing no mention of this plant in the Rev. Kirby Trimmer's "Norfolk Flora," I should be glad to learn whether it has been before met with in this county, and also its other stations besides those given in the books. —*J. Wittey, B.A., Norwich.*

Pollen-Grain.—Whilst examining some pollen obtained from a bee, a short time ago, I found, among others, the following (fig. 147). Can any reader inform me what plant it belongs to?—*R. H. N. B.*

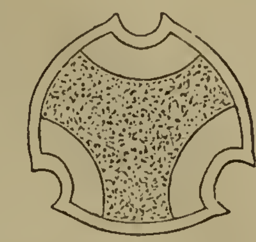

Fig. 147. Unknown Pollen-grain.

GEOLOGY.

"Pick-Cheeses and Fairy-Loaves."—On page 206, in the article on the above subject, reference is made to fig. 130 as "from the Oolite." It should have been to fig. 129.

Geology of Castleton.—One of the most interesting localities on the Derbyshire mountain limestone, for fossil-collecting is Castleton, a spot where we have spent some profitable weeks in that pursuit. We beg to call attention to a neat little handbook to the town, published by Mr. John Tyrn, of Castleton, a well-known dealer in fossils. Visitors will find it of great assistance in going over this capital collecting-ground.

Coal: its Nature and Uses.—Under this heading the Rev. J. M. Mello, F.G.S., has published a paper read before the Chesterfield and Derbyshire Institute of Mining, Civil, and Mechanical Engineers. It deals principally with the economic products of coal and coal compounds, and well deserved to be reprinted.

Elementary Crystallography.—Mr. J. B. Jordan, of the School of Mines, has recently written a capital little book bearing the above title, which is published by Thomas Murby. It includes several large diagrammatic sheets, showing the modifications in the leading types of crystals from the elementary forms, and is the best, most easily comprehended, and cheapest little manual we have yet seen.

Geological Features and Parish Boundaries.—Among the most interesting papers read before the British Association at Brighton last year was one by Mr. William Topley, F.G.S., on "The Relation of the Parish Boundaries in the South-east of England to great Physical Features, particularly to the Chalk Escarpment." Since then the paper has been amplified, and published, with sections, maps, &c., in the *Journal of the Anthropological Institute*. It is a bit of careful, conscien-

tious work, of no slight interest to the antiquary and historian, and still more so to the geologist, as showing how many unexpected points of contact the "stony science" has to deal with. The general purport of the paper is to show that the land divisions of the South-east of England have a well-marked and constant relation to the great physical features, which cannot possibly be the result of accident; and that from this relation we may safely infer that, whatever may have been the origin of manors or parishes, as such, they both depend upon older divisions of the land, which were not formed by the arbitrary act of Church or King, but resulted necessarily from the great physical features of the country.

New Species of Synocladia.—Mr. Robert Etheridge, jun., has just described a new species of *Synocladia* from the Carboniferous Limestone series of Mid-Lothian. Hitherto this genus had not been found below the magnesian limestone of the Permian formation. The new species differ from the Permian forms in the arrangement of the cell-apertures on the celluliferous face—an arrangement which departs considerably from the hitherto recognized *Synocladia* type, in many points approaching that seen in *Fenestella*, yet distinct from it. The name of *Synocladia carbonaria* has been given to this new species of fossil polyzoon.

Quarrymen's Terms for Fossils.—Having read with considerable interest the article on "Pick-cheeses and Fairy-loaves" in last month's Gossip, I should like to add a few words on the terms used by the Lincolnshire quarrymen for the fossils they find there. During my stay in that county, strange to say, I never heard the words "pick-cheeses" or "fairy-loaves" applied to any fossils, although I took occasion to visit a good many different chalk-pits, and made friends with the workmen there employed. It seems peculiar that these names, which are so generally used in Norfolk and nearly all the other counties of England in which chalk is found, should not be used in Lincolnshire—at all events, in the more northern part of it. Of Echinodermata found there, *Ananchytes hemisphæricus* is about the most common form, specimens of it being called "Mushrooms;" and perhaps there is a small resemblance between the two. To increase this, the quarrymen sometimes cut away the matrix of chalk so as only to leave a sort of stem on the under side of the Ananchytes, and when this is done they will sell it you as "a petrified mushroom." The *Terebratulæ*, which occur in great variety, are all classed as "Mussels," while the *Rhynchonellæ* are known as "Cockles." The palatal teeth of *Ptychodus*, which the men now and then find, are called "Palates," and I think that to be a very good guess indeed. In the shingle of the Humber many lias fossils are found. Of these the *Ammonites* and *Belemnites* go by their usual names, "Serpents" and "Darts," while the *Gryphea incurva* rejoices in the euphonious title of a "Bishop's Thumb." Why it is more like a bishop's than any other person's thumb I cannot understand.—*Chas. Cockson.*

NOTES AND QUERIES.

Ethnology of Somersetshire.—At the meeting of the Somersetshire Archæological and Natural History Society held at Wells a short time since, Dr. Beddoe gave a brief sketch of the ethnological history of the county, and showed its bearings upon the physical aspect of the population at the present day. We learn from the paper that the people of the eastern half of the county have, on the whole, broader heads, lighter hair, and darker eyes than those of the western half. In all these respects the eastern men approach more to the ordinary English, the western to the Irish, standard. The mixed-blooded inhabitants of the towns appear to be lighter as to both eyes and hair than the people of either division. The fair and handsome Frisian type is pretty common in the north of the county. In the hilly south-eastern region about Wincanton dark complexions and dark or even black hair attest the late and imperfect Saxonization of the country; the same may be said of the Quantocks. About Minehead and Dunster, perhaps from the less fixity of the population induced by seafaring, there is more evidence of mixture of blood; and in Exmoor and in some villages of Mendip the narrow skull, prominent jaws, and bony frame of the Gaelic type and the Turanian oblique eye and pyramidal skull crop up.

Earthquakes in South America.—A despatch from Havana, dated August 19, states the late advices from Lima and Peru report a serious accident had occurred sixty miles from that city. A body of earth, estimated at 10,000,000 cubic yards, fell from a mountain side into a valley, severely injuring a number of persons, and damming up a river, the water of which had risen 109 feet above its usual height. Engineers were of opinion that the water would soon burst its barriers, when it would rush towards Lima, sweeping everything before it, and submerging the lower portion of the city. Several towns in Chili had been greatly damaged by earthquakes.

A Sensible Parrot.—A friend of mine has a very sensible parrot. Some time ago the lighted end of a cigar fell by accident just under the door of Polly's cage. The fumes soon attracted her attention, and she instantly set about removing the danger. Taking up a small cup containing cold tea (for which she has a great partiality), she poured the contents on the burning end, with the greatest coolness imaginable, and extinguished it.—*G. O. Howell.*

The Landrail (Crex pratensis).—I beg to inform Mr. F. Anderson that, in the years 1870 and 1871 the landrail was very plentiful in the neighbourhood of Gravesend. In the following year, however, there was a marked diminution in the numbers both seen and heard; whilst this year it has, apparently, disappeared altogether. I am unable, however, to account for its disappearance.—*G. O. Howell.*

Sucked Eggs.—While looking for birds' nests one day last month, I came across a blackbird's nest, containing five eggs all sucked clean, through a medium-sized hole in the side. I was told that this was done by a cuckoo. Do cuckoos suck eggs? if not, what could have done this?—*Edw. H. Wigzell.*

British Shrews.—A correspondent asks in the present number of Science-Gossip how many species of shrews are placed on the British list. I presume Bell's "British Quadrupeds" is the standard text-book on such a point, and I there find three species described; viz. the Common Shrew, the Water Shrew, and the Oared Shrew. The first, the Common Shrew (*Sorex araneus*, Linn.), is described as follows:—"Specific character: Reddish mouse-colour above, paler beneath; tail somewhat quadrangular, rather shorter than the body, not ciliated beneath. 2nd. *Sorex fodiens*, Water Shrew. Specific character: Nearly black above, white beneath, the colours distinctly separated; tail two-thirds the length of the body; feet and tail ciliated with strong white hairs. 3rd. *Sorex remifer*, Oared Shrew. Specific character: Tail quadrangular, compressed towards the apex, ciliated on the under surface; feet strongly ciliated; body black above, greyish-black beneath; throat yellowish ash-colour."—*T. W.*

Mounting Crystals.—I shall feel much obliged if you will put a line in your column of "Notices," to inform me what is the best material for preserving crystals when required to be mounted on slides. I have tried castor-oil and balsam and varnishes in vain.—*A Constant Reader.*

London Botany.—What is the best book for a Londoner to buy on British Botany,—one who has not much chance of getting out for more than a day or two at a time on a botanical search? Also the price and publisher.—*Wm. Somerton.*

Plusia chrysitis taken at Sugar.—Having been told that this noctua never comes to sugar, it may be interesting to know that I took a specimen on Wednesday, the 6th July, at sugar in my garden at Kensington. I shall be glad of any information on this subject.—*W. H. Kennell.*

Rare Birds and Grouse.—Having been up Teesdale on a geological tour,—on the Weel we flushed a mallard and saw one dipper; at Falcon Clints, a little below Caldron Snout, a fine old raven, and a little lower down the river a pair of peregrine falcons and many plovers and ring-ousels. The next day, in Langdon Beck, a tributary of the Tees, although not half a mile up the rocky burn, we saw five dippers and three sandpipers, and in descending the Tees near to Winch Bridge saw seven sandpipers and another dipper; but although we went up on the Durham side by Widdy Bank, and came down by the Yorkshire side, from near Maise Beck, by Cronkly Scar and Holwick, to Winch Bridge, we only saw three live grouse, but many dead ones. Is it not possible that the Red Grouse is shortly to be one of the things of the past?—*Josh. Duff.*

Ancient Trees: the Yew (*Taxus baccata*).—The yews at Fountain Abbey are celebrated for their size and age, having been trees of no mean dimensions when the abbey was founded in 1132, as we gather from the traditions handed down; viz.—that the monks who built the monastery resided beneath the shelter of these very yews during the time of its erection. One of them is beautifully illustrated in Strutt's "Sylva," and of their dimensions some idea may be formed from the fact that the trunk of one of them is nearly 27 ft. in circumference. The Ankerwyke yew, supposed to be upwards of 1,000 years old, within sight of which the Magna Charta was signed, and under whose shade Henry VIII. is said to have made his appointments with Anne Boleyn while she resided at Staines.—*H. G. G.*

Bitten by a Viper.—The following paragraph from the *Dorset County Chronicle* of July 31st will be interesting to those correspondents who have taken part in the discussion on the bite of the viper. "Mr. Duntze Carew was going to Babicombe, in company with his wife, when a snake, 22½ inches long, crossed their path and was captured by Mr. Carew, who thought it was of the harmless kind, one of which he had previously tamed. The snake was taken home and freely handled next day. On Mr. Carew, however, going to take it out of its box in the evening, the reptile, which proved to be a viper, bit him in one of his fingers. Mr. Carew immediately sucked the wound and applied ammonia, but the arm became swollen to an alarming degree, and he ran to a doctor, and three medical men were soon in attendance. The lips, however, soon became indurated and the poison spread rapidly. For an hour there was no relief, the tongue became swollen, Mr. Carew could not swallow, and he became speechless. The surgeons continued to apply remedies, and at last had the satisfaction of staying the effects of the poison, and Mr. Carew is now in a fair way of complete recovery."—*W. Macmillan, Castle Cary, Somerset.*

How to Preserve Fish.—I cannot find anything that will direct me how to preserve fish. Having taken some fine specimens of perch, I should take an interest in stuffing them myself, if it be possible for an amateur to do so. Could any of your correspondents advise me?—*Jas. Massingham, jun.*

Male and Female Butterflies.—Would some reader kindly inform me of the distinguishing marks between male and female (*V. urticæ*, *C. pamphilus*, *C. phlœas*) through the pages of Science-Gossip, as the books I have do not mention the female at all?—*J. W. Russell.*

Strange Problems in Natural History.—I do not know how it is possible to answer your correspondent "S. A. B.," as he gives no account of the composition of the "stone." Concretions of lime are not uncommon in the salivary and neighbouring glands in animals, and the probability is, this was one.—*W. T. Iliff.*

Barley grown from Oats.—In Science Gossip, vol. vi. page 164, Notes and Queries, is a paragraph entitled "A Field of Barley grown from Oats." The oats are sown in July, and after remaining until nearly ripe they are cut down, within an inch and a half of the ground, this process being repeated a second time; they are allowed to remain through the winter, and in the following season the produce is barley, the leaf and stalk being oats. Can any correspondent explain the "why and the wherefore" of this wonderful transmutation? thus discovering, if true, a law and principle hitherto unknown.—*Thomas C. Oborn.*

Rearing Larvæ.—Will any of your readers kindly inform me as to the best mode of rearing lepidopterous larvæ, that have only just emerged from the egg? The ordinary breeding-cages are not suited to them, as the very diminutive larvæ can easily escape; and even if they do not, there is the probability of their straying too far from their food. —*M. A. H.*

Maggots in Stuffed Birds. — Your correspondent "R. M." wants to know how to keep the maggots out of a stuffed bird. The following way will, I think, prove effective: Dip the bird into a weak solution of arsenic and dry in a draught, at a partially opened window.—*C. B. B.*

How to make Aquaria Water-tight. — "W. K. G." wants to make an aquarium out of an oblong glass shade, but cannot make it water-tight. Has he tried the common marine glue, which can be bought at almost any oil-shop? If so, and this has failed, I should recommend Kay's coaguline, which can be purchased of any druggist; but I should think marine glue would keep the water in. —*C. B. B.*

Mounting Microscopic Fungi.—I should recommend Mr. E. L. Hull to use some of Kay's coaguline for mounting microscopic fungi.—*C. B. B.*

Singing Mice.—A friend of mine, whose veracity I have no reason to doubt, states that he has several times noticed the peculiar singing noise made by *field*-mice, but has never noticed it in its more domesticated relative.—*C. B. Barnes.*

Entomology of London.—Is there any guide to the entomology of the neighbourhood of London beyond Mr. Newman's brief notes on the subject in the "Saturday Half-holiday Guide"?

British Butterflies. — Your correspondent "Maberley" will find full information as to localities, &c., of all the British butterflies in any of the following works:—Newman's "British Butterflies," published by Tweedie, 7s. 6d.; Coleman's "British Butterflies," 3s. 6d., coloured plates, and the first two or three numbers of Stainton's "Manual of British Butterflies and Moths," price 3d. each number.—*M. A. H.*

Saturnia carpini.—In Science-Gossip for July last I notice an article on the Emperor Moth (*S. carpini*), in which a very full description of the various changes of the larva is given. The only account given by Newman, in his "British Moths," is the following:—"The caterpillar is of the most delicate green colour, the segments being very distinct, and each being adorned with pink tubercles, each surmounted by a black ring, and emitting a few short black bristles." I found, on August 23rd, one of these larvæ in its last stage: it turned to pupa on the following day. In this specimen the breathing-holes were pink, the tubercles on each segment were *bright yellow*, each being surrounded by a black ring. Your correspondent mentions the yellow tubercles, but the description in Science-Gossip last year, p. 230, mentions *pink* tubercles. Is the variety in the colour caused by change of skin or by the food-plant? My specimen was found on heath. Perhaps some correspondent can tell me the name of a caterpillar marked something like *S. carpini*, but having at the end of each bristle a spot or lump of some substance exactly resembling a small opal. It was found at Fontainebleau some three years ago, and spun a cocoon exactly similar to that of the Emperor, but unfortunately died in the pupa state. It would be a good thing if readers of Science-Gossip would now and then note the changes in, and description of, larvæ which may come under their notice, and jot them down in the same manner as Mr. Ullyett has done, and as Mr. Newman and the Rev. H. H. Crewe did in the *Zoologist* some nine or ten years ago.—*W. T. P. W.*

Notes on Aphides (p. 173).—In answer to the query of "E. P. P." I beg to state I have often seen a young Aphis adhering to the syrup-tubes of its parent: but the one I wrote about was the only young Aphis I ever saw actually partaking of the syrup. It might have been doing this on the former occasions, but from not having examined the case closely, I cannot state it as a positive fact. The leaf on which I saw the one that did it, was attached to the currant bush, which grew out of doors, and was largely infested with Aphides. In my examination of the above Aphis, I used the ordinary Coddington lens, subsequently the 3 and 2-inch objectives of my microscope. I never myself saw an Aphis actually laying its eggs; but a friend, a studious observer, states he has seen the process, and says, "that they are laid on the stalk of the youngest shoot of the plant in autumn; the eggs being placed close together, and covered with a greenish kind of mucus; they are of a reddish colour, and it is the 'Winged Aphis' that lays them." I have observed similar eggs, as those just described, but thought probably that they belonged to some kind of fly or other insect.—*Ralph H. Westropp, A. B. T. C. D.*

The Liver and the Seal of Liverpool.—Although the seal of Liverpool has been the object of great discussion, particularly amongst local antiquaries, and has of late likewise been a point of argument amongst naturalists, I beg to make a few remarks which may elucidate the subject, and show the "liver" to be but mythical. Hithertofore and up to the present time the bird which is on the face of the seal of the borough of Liverpool has been looked upon as a "liver," or sea-duck, with a branch of laver, a species of seaweed, in its beak. This has been affirmed on the authority of Randle Holme, a well-known antiquarian. It was not until a few years back that one of the local antiquaries discovered, after much careful study and observation, that the inscription on the tablet or scroll which formed a footrest for the bird, signified "*Johannis.*" It had been before this inexplicable, on account of the letters being inverted. The bird is not, as has been supposed by some, the duck, with a fragment of seaweed in its beak, or the dove of Noah with the olive-branch; nor is it, as has been supposed by others, the eagle of Jove: it is the eagle of St. John, who, whenever he is represented, is always accompanied by the eagle which attended him during his mission in the Isle of Patmos, carrying in its bill what is, or what is intended to be, an ink-horn. Those skilled in deciphering ancient sepulchral inscriptions will know how often the figures, emblematical of the four evangelists and Christ, occur. How the burgesses of the town came to adopt the emblem of the Evangelist for their seal is slightly shrouded in mystery. It is, however, supposed, that it was on account of there being in the town a guild dedicated to and under the patronage of that saint. There was no church in honour of the Evangelist; but in that dedicated to St. Nicholas, the patron of mariners, there is a small chantry erected in honour of St. John. The reason the

emblem has been so inexplicable was owing to the blunder and ignorance of the engraver, who engraved the inscription reverseways, and the seal again suffered through the greater ignorance of a second engraver to whose care it was intrusted.—*J. P. S.*

Blue-bottle Fly (p. 211).—In answer to "S. A. B.'s" query, I may say that, as blue-bottle flies live entirely on sweets, it is by no means an uncommon occurrence to see them round flowers. In autumn they swarm about the ivy blossoms, in company with bees, butterflies, and wasps.—*W. H. Warner, Kingston.*

Singing Mice.—My experience with these unnatural songsters accords more with Mr. Sims' than with Mr. Palmer's, as I never remember to have heard but one in the act of singing. This was in October, 1872, and the performance reminded me of three things—the spluttering of a roasting apple, the soft twittering of young birds, and the crying of a toy doll. The song appeared to be of a ventriloquial character, seeming to come from my pocket, then from a sack lying on the ground, and lastly from under a meal-chest where the performer really was.—*W. H. Warner, Kingston.*

The Landrail (p. 214).—Mr. F. Anderson's query respecting this bird brought to my recollection the fact that I had not heard its familiar note for at least three years. Formerly (that is a few years back) it used to occur quite commonly in this neighbourhood, and its everlasting crake-crake-crake! from the field opposite often prevented the welcome approaches of Morpheus. I can assign no reason for the disappearance of the bird.—*W. H. Warner, Kingston.*

Death's-head Moth.—In answer to your correspondent C. B. Barnes, the Death's-head Moth (*Acherontia atropos*) is very uncertain in its appearance, and is often found in a locality where it has not been seen for several years before. I once found a good many of the larvæ in the potato-fields near a town in Wiltshire, where I was then residing, and for seven years afterwards I did not see a single specimen; it then occurred again in considerable abundance, but for one season only. The larvæ may easily be found, as they make their presence known by their ravages. I have seen a square yard of healthy potato plants completely stripped of foliage by a single larva.—*E. Lovett.*

Stinging Fish.—In the *Echo* of September 3rd there is a letter from a special correspondent, giving an account of a day's shrimping on the Lincolnshire coast, in which he says that they captured, amongst other things, "a score or two of silvery fish as big as a gudgeon, which, upon being shaken out of the net, shuffled themselves down into the wet half-liquid sand till nothing was visible but their sand-coloured backs, armed with some villanously sharp prickles, which make a wound hard to heal and dangerous to waders." Could any of your readers inform me what is the name of this fish? as I have since heard from another source that a gentleman was so badly stung in the hand by one of these fish that he was told by his doctor that he had barely escaped amputation.—*E. Lovett.*

Sparrows and Fruit.—An American correspondent, Mr. H. W. Hallenbush, sends us an instance of the great benefit of the English sparrows, which are very numerous and doing well in the town and vicinity of Reading, Pennsylvania. Every season for several years a plum-tree (*Prunus domestica*) at his father's house was attacked by caterpillars and insects, which stripped it of its foliage and prevented the fruit from ripening. But now the sparrows have taken up their quarters there and shown no mercy to the army of insects, the tree is recovering its verdure and its fruit growing to the full size.

"Praying Mantis," sometimes called the "Soothsayer," is one of the most pugnacious of insects, and little merits the name it bears in Italy, Spain, and all the south of France, where the devout, struck by the peculiar way in which it holds up its forelegs, when suspended motionless in the air, waiting for its prey (other insects), term it "the *Praying* Mantis." A lady, a friend of mine, nearly got herself into some trouble on the Continent, she told me, by caging two of them; so exceeding superstitious were the people by whom she was at the time surrounded, that they believed some dire misfortune must surely follow her profane act. The Mantis is carnivorous, and will even kill its own relations and eat them. It belongs to the *Orthoptera*, and is consequently a cousin of the "Walking-leaf."—*H. E. Watney.*

Food of the Tortoise (p. 165).—The common land tortoise, so usually kept in gardens, is purely a phytophagist, and so far differs widely from its aquatic brethen. It will eat most vegetables, but prefers the milky compositæ, as was long ago observed by Gilbert White: "Milky plants, such as lettuces, dandelions, sow-thistles, are its favourite dish" (Letter of October 8th, 1770, to Danes Barrington). Your correspondent will find many interesting particulars as to the habits of the tortoise in the same series of letters.—*R. A. Pryor.*

Ants.—Will any one kindly inform me how to extirpate a colony of ants, which, when driven from a corner of a greenhouse, enter a frame near growing melons, &c., and *vice-versâ*, and have done so for years?—*E. B. F.*

A Lost Owl.—Between eight and nine in the evening, a few weeks ago, I was seated in the centre of a large seaport town, when I noticed a beautiful white owl (*Strix flammea*) fly from the sea, and stop upon a tree about twenty yards off. After stopping there some few minutes it flew away in the same direction from whence it came. I should be glad if any readers of the Gossip can tell me whether it is customary to find an owl in a place of this description.—*R. G. Bately.*

Swarm of Cockchafers about a Tree.—One often sees, during what have been called "cockchafer years" (for the insect is notably more abundant in some years than in others), a number of the beetles at eventide; but they are not usually under the influence of any particular attraction noticeable by us. A few evenings ago, I observed, just at sunset, a swarm of cockchafers flying at various elevations about a sycamore-tree, not settling mostly. They were attended upon by a host of small boys, who happened, unfortunately for the beetles, to come across them, and set to work diligently to knock them down. The cockchafers were certainly not feeding upon the leaves, and the tree was not in flower, and I could only account for their presence by the supposition that the scent of the honey-dew deposited on the leaves by a pretty numerous family of the Aphides, had drawn them thither, though they did not appear to be imbibing it.—*J. R. S. C.*

NOTICES TO CORRESPONDENTS.

We must remind our friends, who make use of this column, that the following rules should be strictly adhered to:—First. That perfect specimens be sent. Secondly. That all the information as to habitat, &c., that the inquirer can give should be forwarded with them. Thirdly. To bear in mind that drawings, unless very perfectly executed, are useless, and a tyro is very apt to omit some distinctive characteristic which would enable the examiner to decide the genus and species of the object sent. Never to send an object for identification until the inquirer has used his best endeavours to find out for himself all the information he requires. Questions are very frequently sent, which the slightest effort on the part of the querist, in looking through some elementary treatise, would have given all the knowledge required.

H. J. McGill.—Your botanical specimens should not be sent in cotton-wool, and they should be each numbered. They are as follows:—Red Campion (*Lychnis diurna*), Amphious Polygonum (*Polygonum amphibium*), and Toad-rush (*Juncus bufonius*).

A. K. Laslett.—The moth is the common Swift (*Hepialus lupulinus*); the caterpillar and cocoon are those of the Lackey Moth (*Bombyx neustria*). The parasitic growth on the coltsfoot leaf is a microscopic fungus, probably *Æcidium compositarum*, var. *Tussilaginis*.

W. Perry.—There can be little doubt that your inclosure consisted of minute particles of iron. Under the microscope they exhibit a crystallographic shape. Magnetic iron in sea-sand is not of uncommon occurence. The celebrated Taranaki iron of New Zealand occurs in this manner.

Geo. Lee.—Webster's Dictionary, edited by Dr. Porter and Dr. Goodrich (London: Bell & Daldy), gives the list and pronunciation of most scientific terms. The "Imperial Dictionary" does the same, perhaps more copiously.

Manchester.—There was some little difficulty experienced in regard to your specimens, as we do not undertake to name *foreign* specimens. No. 1 is the pupa of some insect. No. 2, the excretions of a species of *Aphis* attached to the hairs of the leaf. No. 3 is a Micro-fungus, but not sufficiently developed to determine the genus.

E. Clarke.—Many thanks for your welcome and well-mounted specimen of *Gentiana verna*.

J. F.—Your specimen of *Stachys annua* came duly to hand, for which accept our best thanks.

T. Roper.—Apply to Van Voorst, London.

J. Makinson.—No. 1, *Bulimina obtusa*; 2, *Dentalina aculeata*; 3, *Rotalina oblonga*; 4, *Textularia variabilis*.

Ellen M.—Your specimen is *Asplenium viride*—a rather rare fern.

Mr. White, Ealing.—Your specimen of minute fungus found on dry cowdung is *Peziza granulata*.

J. G. R. Powell.—The specimens came duly to hand, for which accept our thanks.

F. A. Steele.—Your plant is the common Centaury (*Erythræa centaurium*), belonging to the natural order *Gentianaceæ*.

W. James.—Your specimen is the narrow-leaved Cotton-grass (*Eriophorum angustifolium*).

F. Duignau.—Write to Mr. T. D. Russell, 37, Arundel-street, Strand, London, for his catalogue. See article on "Collecting and Preserving Geological Specimens" in February No. of Gossip for 1872.

R. M. wishes to know the best method of preserving sea-anemones for collections. We never heard of such a thing, but perhaps some of our readers have, and if so, will kindly answer R. M.

C. J. Evans.—We should imagine you would find no difficulty in obtaining the "Frog-bit" from any aquarium-dealer—say King's, Portland-road, London. If you have any Norfolk friends, they would have no difficulty in procuring any quantity for you.

G. C. Druce.—Your specimen is the upright Cudweed (*Gnaphalium sylvaticum*). Perhaps some of our readers will kindly take the hint, and give us the name of the best flora o Northamptonshire.

J. Nunn.—We have no doubt that Mr. Thomas Brittain, of the Manchester Aquarium, will supply you with information as to shingle for the aquarium.

H. C. Chadwick.—You will see full instructions about preparing skeleton leaves in an article in Science-Gossip for February, 1872.

EXCHANGES.

Micrographic Dictionary, and other works on Microscopy or Botany wanted, for Micro. Slides.—Wm. E. Green, 47, Park-street, Bristol.

C. Davus, *Pamphilus*, *M. margaritata*, *E. fasciaria*, *B. rhomboidaria*, *P. trepidaria*, *F. piniaria*, *L. pectinitaria*, *T. firmata*, *B. fascalis*, for other Lepidoptera. Accepted offers answered within a week.—James J. F. King, 137, West Prince's-street, Glasgow.

Sea Birds' Skins, British Marine Algæ, and a few minerals for Birds' Eggs or Lepidoptera.—J. T. T. Reed, Ryhope, Sunderland.

North America and West Indies.—Zoological and botanical specimens for scientific publications.—J. Matthew Jones, Halifax, Nova Scotia. (Nova Scotian postage 3d.)

Minerals, Rocks, and Fossils, wanted for British Lepidoptera.—F. Duignau, St. Paul's-terrace, Walsall.

Good Birds' Eggs or Lepidoptera wanted for well-mounted Microscopic Slide or Material.—Address, W. T., care of Mr. Martin Burges, 10, Ashby-place, Brockley-road, S.E.

Diatomaceous Material from Gravesend and Greenhithe, for good mounted objects.—Geo. Elisha, 2, Cross-street, Shepherdess-walk, City-road, N.

Lond. Cat. Brit. Plants, Nos. 90, 307, 468, 1160 (verus), 1166 (Cornwall, 1262*, &c., offered for other rare species.—W. H. Beeby, 41, North-end, Croydon.

Parasite of Partridge, for other well-mounted Parasites.—A. C. Tipple, 16, Ennis-road, Finsbury-park, N.

For Tongue of Limpet, *Patella vulgata*, unmounted, send stamped, directed envelope to C. L. Watchurst, 33, Blessington-road, Lee, London, S.E.

Membrane of Bat's Wing well mounted in balsam, for any good Slide.—E. Lovett, Holly-mount, Croydon.

Will any reader of Science-Gossip send me a few Berries of Mistletoe, for other plants or leaf fungi?—H. W. Hallenbush, 320, Spring-garden-street, Reading, Pennsylvania, U.S.

Nos. 307, 483, 558, 919, 942, 1242, Lond. Cat., and *Trifolium stellatum*, for other rare, local, or critical species.—Lists to A. Bennett, High-street, Croydon.

I have the following plants:—*Crocus minimus*, *C. nudiflorus*, *Thesium linophyllum*, *Geranium phæum*, *Lathyrus nissolia*, *Campanula patula*, *Orchis ustulata*, *Cuscuta Europæa*. Desiderata: British Lepidoptera. Names sent on application.—E. A. Hall, Whatton Manor, Nottingham.

Scirpus parvulus, from Arklow, co. Wicklow, the only British station at present existing, for other rare British plants.—Richard M. Barrington, Fassaroe, Bray, co. Wicklow.

For genuine Larva, unmounted, of *Chinchilla laniga*, and *Arvicola arvalis*, send stamped envelope to J. O. Harper, Dereham-road, Norwich.

BOOKS RECEIVED.

"On the Relation of the Parish Boundaries in the South-East of England to great Physical Features." By W. Topley, F.G.S.

"The Philosophy of Evolution." By B. Thompson Lowne, F.L.S. London: Van Voorst.

"The Natural History of the British Diatomaceæ." By Dr. Donkin, part 3. Van Voorst.

"Micrographic Dictionary." Parts 11 and 12. London Van Voorst.

"Les Mondes."

"American Naturalist." July and August, 1873.

"Coal, its Nature and Uses." By the Rev. J. M. Mello.

"Monthly Microscopical Journal." September.

"Grevillea." September.

"Astronomical Register." September.

Communications Received up to the 7th ult.—Dr. C. C. A.—F. A. S.—E. A. H.—A. K. L.—C. B. K.—C. J. E.—F. K.—W. S.—T. E. A.—E. A. H.—J. W.—G. E.—W. T.—E. H. W.—T. B.—F. D.—T. W.—R. M.—W. B.—Capt. J. A. P.—W. J.—W. T. I.—E. D. B.—E. L.—T. W. W.—J. H.—H. A. M.—G. L.—Dr. A. M. E.—J. W. R.—E. L.—E. E.—T. C. O.—A. C. R.—W. T. P. W.—T. S. D.—C. L. W.—C. B. B.—W. H. W.—J. M.—J. F. K.—W. W.—J. M. J.—T. M. H.—F. A.—J. P. S.—C. C.—J. G. R. P.—H. J. McG.—T. B.—H. W. H.—J. T. T. R.—E. L.—W. H. W.—A. B.—W. N. L.—A. C. T.—E. C. J.—H. C. C.—H. E. W.—J. D.—R. H. W.—J. C. D.—W. H. B.—G. O. H.—R. M. B.—I. O. H., &c.

ON THE IRREGULARITY OF APPEARANCE OF MARINE ALGÆ ON THE BRITISH COASTS.

No. 2.

By W. H. GRATTANN.

IN the September number of this Journal I wrote on the appearance and disappearance of certain species of marine algæ on various parts of the British coasts. I am now about to give the result of my observations on the disappearance of some rare species of algæ from the localities in which I found them last season, and of the appearance of some other unlooked-for species in the situations so lately vacated by their predecessors.

On one of the rocky eminences just round the Corbon's Head, in Torbay, there is a deep round hole, which, at the recess of the tide, is always left full of sea-water, and in this rocky hollow many species of green, olive, and red seaweeds have, season after season, found a sheltered place of growth. This is the third season that I have paid periodical visits to the shores around Torquay, and as regards the rock-pool just spoken of, which I have looked upon as a nursery for rare algæ, I have wondered that the same species of plants should not be found there two seasons consecutively. Last summer, as stated in my former description of this very pool, I found the rare green plant *Bryopsis hypnoïdes* growing in profusion, and although I helped myself pretty liberally, I left many beautiful fronds of it there; and upon many subsequent visits, I watched the gradual breaking-up of the pretty green branches, and even the final disappearance of the plant, and as I felt pretty sure that no other collector had disturbed it, I waited with a botanist's patience and interest for the return of spring, hoping to find a goodly supply of this rare and beautiful Chlorosperm.

Although this plant is a summer annual, it ought, in a sheltered place, to have made its appearance by the end of May at the latest; but I regret having merely to record my disappointment, for there was not a scrap of it in the place. If the species were perennial, we should look for young plants springing up from the old stems, and should most probably find them as the season advanced; but this plant is propagated by zoospores or active granules, which are, in fact, nothing more than a transformation of the endochrome, or colouring matter of the tubular cells of the plant; and as upon their emission from the parent cells they would naturally be swilled out of the rock-pool by the in-flowing tide, and would be very unlikely to be brought back again to the same place, I think it not improbable that this may account for the absence this season of *Bryopsis hypnoïdes*. If this be so, the same tides which carry away the spores of some seaweeds to distant localities, may also bring the fruit of others; and thus, while I regretted the loss of *one* rare plant in the Torbay rock-pool, I was rejoiced to find another which I had not previously seen in that locality, nor indeed in any other situation around Torquay. This was the pretty olive plant *Striaria attenuata*. It was growing on the old stumps of *Ceramium rubrum*, which fringed the sides of the rock-pool. In my former paper I described another rock-pool, which is merely a wide hollow basin on a projecting ledge of rock, far up one of those cavernous openings round the Corbon's Head, in which I found, last season, some lovely specimens of *Bryopsis hypnoïdes*.

But here also this species was absent, and in its place I found a beautiful form of *Ectocarpus granulosus*, a filamentous olive weed, which I found there for the first time.

During Easter week I paid some visits to the rocky shelves and pools near Hope's Nose, a rocky promontory between Torquay and Babbacombe, eagerly expecting to find *Laminaria fascia* growing abundantly there, as I had found it during two previous seasons. I did not, however, find a single frond; but one morning, about a week afterwards, I was sauntering along the beach below Hesketh Crescent, and caught sight of a pretty little rock-pool literally full of this rare *Laminaria*. This is one of the smaller and somewhat rare species of the genus, usually found in sandy nooks in rock-pools, but rarely, as in this instance, near high-water mark. I mounted a number of groups to imitate the appearance of its ribbon-like fronds in the growing state, having left behind me a vast number of beautiful fronds; but on a subsequent examination of the locality, every portion of the plant had disappeared. Very near the spot, nearly at high-water mark, are other pools very abundantly productive in species; and here I took this season a curious and interesting form of *Chordaria flagelliformis*, a long scourge or whip-like plant of the olive series, the fronds of which were literally covered with the tiny frustules of a marine diatom. Hard by, in another pool, and completely encircling a great rock in its centre, was the pretty green plant *Cladophora arcta*, by no means a common species, and one I have rarely met with for years, yet here it was growing in the greatest profusion. The same morning I had the good fortune to find a beautiful specimen of *Desmarestia viridis*, cast ashore by the waves; but as my small seaweed-bag was full, I placed my *Desmarestia* inside the folds of my umbrella, a very convenient method of carrying *some* species, though it did not agree with *D. viridis*, for, upon removing it at home for examination, I was surprised to find it in a rapid state of decomposition. All the species of *Desmarestia* not only rapidly decompose and turn a verdigris green in drying, but have the singular property of destroying all kinds of delicate red weeds with which they are placed in contact. The odour which these curious olive plants emit is very offensive; but if they are put into a bottle of sea-water and kept so until they are removed for mounting on paper, they may be preserved without injury for several hours.

Punctaria tenuissima is an extremely rare plant, which I took on one of the groynes at Brighton ten years ago, but have never seen since until the spring of this year, when a characteristic tuft of it was floated in by the tide near Corbon's Head. It generally grows parasitically on the green blades of *Zostera marina*, or "grass-wrack," or on the old fronds of *Chorda filum*, or "sea-rope." Mrs. Griffiths, of Torquay, considered this plant to be merely the young of *Punctaria latifolia*, but I am of a very different opinion. The substance of *P. tenuissima* is much more delicate; and besides, I have never found these plants growing in the same situations. *P. latifolia* is parasitic, or at least epiphytic, on algæ in rock-pools, but never, or very rarely, in deep water, whence *P. tenuissima* is usually cast ashore, and always attached to species on which *P. latifolia* is never found growing.

That delicate little Rhodosperm, *Callithamnion Brodiæi*, has been cast ashore rather plentifully this spring, and finely in fruit. It requires sharp eyes to detect this tiny plant as it comes floating in with other and ruder forms of marine vegetation, but when nicely spread out and carefully mounted, it is indeed a lovely object. Last season, the gorgeous *Padina pavonia*, or "peacock-laver," was abundant in some of the shallow pools near the Torquay Abbey Rocks, and down towards Paignton; but as it is a summer annual, it should not be looked for until the early days of June, or a little later. A subsequent visit to that on which I found the *Callithamnion Brodiæi*, convinced me that *Padina pavonia* would be very plentiful this summer, and so I found it all through July; the fronds being clothed with those beautiful golden filaments which are mainly the cause of the peculiar iridescence observable on this plant when it is seen in shallow water under a strong sunlight.

Just at the close of last season I met with a solitary plant of the rare *Griffithsia setacea*, growing in a deep rock-pool between Torquay and Paignton. I took a few bunches and left the rest undisturbed. As this species is perennial, I looked anxiously for it during my visit to that locality in June, and was delighted to find it growing in the same place, and in tolerable plenty. Some of the tufts were in fruit, the form known as "involucral;" the involucres being in fact a transformation of lateral ramuli, or tiny branchlets, for this express purpose; the endochrome, or colouring matter, of the terminal joints of the ramuli, being converted into spores. These little involucres are extremely beautiful microscopic objects; under a high power they appear like pink wicker baskets filled with crimson cherries. In my former paper I spoke of that extremely rare plant *Gigartina Teedii*, as having disappeared from its habitat in Elberry Cove, Torbay, where in years gone by it was taken by the late Mrs. Griffiths, of Torquay. I am delighted to say I picked up a specimen of this rarity among the rejectamenta of the tide on the 31st of May last. The specimen was hardly the normal development of the species, but it was clearly the long-lost *G. Teedii;* and thus I am in hopes of meeting with good plants of this species next season.

It is not often that the water is sufficiently free from motion to admit of an examination of the out-

lying rocks off Hope's Nose, but on the 1st of May, the day being particularly favourable for the purpose, I took a boat from Babbicombe and rowed round to Hope's Nose, landing first on the Flat Rock (which, by the way, I found anything but flat, and as rough a place to walk on as ever I attempted). The greater parts of the south and west sides of this rock are clothed with a dense growth of various species of *Fucus* and *Laminaria*, besides many common species of red weeds; and here and there, under the shelter of the larger plants, I found some very beautiful specimens of *Polysiphonia urceolata* (so called from the pitcher or urn-shaped form of its spore-vessel), and its variety, *P. patens*, or the spreading Polysiphonia, the ramuli or ultimate branchlets having the curious habit of spreading or sometimes curving over in a reflexed manner. This variety I have never taken in shallow water, but generally it is cast ashore; and in drying, it usually turns black, whereas the plants which I took from the Flat Rock have all retained the fine brown-red tint of the growing *Polysiphonia*. Leaving the Flat Rock, I rowed round the Great Rock, which lies out, I am told, a mile from the shore. This splendid rock, rising almost precipitously out of the sea, reminded me somewhat, though on a smaller scale, of the famed *Ailsa Craig*, off the mouth of the Clyde. As the sun was shining and the water wonderfully clear, it was a fine sight to look down into the deep water on the outer side of the rock, and watch the great fronds of the Oarweeds waving to and fro with the motion of the water. I greatly wished to land there, for I have been told there are a few curious plants growing on the summit of the rock; but the boat was somewhat fragile, and I feared, being a mile from land, that the heave of the wave might run the boat against the rock unpleasantly, and so I merely took note of what I intended to examine on a future occasion. Returning from the rock and finding the tide favourable for landing on the outer reefs to the west of Hope's Nose, I had a good examination of the pools in that direction, and was rewarded with a fine specimen of the rare *Cladophora pellucida*, and two or three forms of that Proteus among seaweeds, *Gelidium corneum*. Of the green plant, *Cladophora pellucida*, I made two good specimens, for I felt pretty sure of not finding *that* species again very soon. This was the first time I had met with it in this part of Devon. It was growing in a pool full of red weeds of different kinds, but without the companionship of a single green plant; and although I searched about in all directions, I did not find another specimen of this beautiful Chlorosperm. As regards the red plant, *Gelidium corneum*, nearly every pool teemed with one or other of its varieties, the most attractive being the broad-fronded variety, *latifolia*; the others were chiefly the common variety *pinnatum*. This species, and its varieties mentioned above, must have fruited abundantly last season, for although I found it growing pretty freely in some of the rock-pools, the quantity *this* season exceeds anything I ever remember in this way. Every step I took, from low-water to within a few feet of the rough pathway that leads up to the field, I saw this seaweed attached to the rocky sides of the pools, and growing in tufts on the limpets, some of which were slowly moving over the surface of the rocks with this miniature plantation on their shells. This reminded me of a singular sight I once witnessed in a rock-pool near Tynemouth, in Northumberland. I was examining the contents of a most prolific rock-pool, when I was suddenly startled by seeing a bunch of plants of various kinds, which appeared to be growing at the bottom of the pool, give a jerk and then wriggle across to the side away from me. A poke or two with my stick soon solved the mystery. It was a good-sized crab, which was literally covered with a growth of *Confervеæ* and other small species of green plants. The carapace of the poor crustacean was as large as my fist, and while the creature was quiescent, not a particle of its shell was visible, so completely covered was it with vegetable growth, which must indeed have been rapid, as crabs cast their shelly covering several times before they attain the normal size of their species.

I have rarely visited the rock-pools about Hope's Nose without finding some rare and interesting algæ, but this spring, although I found several species quite unexpectedly, I have hitherto sought in vain for that favourite plant known as *Delesseria sanguinea*. Last season, I took some beautiful specimens in that locality, which were growing in two widely separated pools, but taking care not to injure or disturb the roots, for as this species is perennial, or at least biennial, I hoped to find fresh leaflets this spring; but nothing of the kind had made its appearance in *that* direction. I took *one* good specimen of this lovely plant in a pool near Paignton; and numbers of wave-beaten fragments which were cast ashore near Meadfoot Rocks, proving the existence of this species at no great depth in that direction; but unless one has recourse to the dredge, there is little chance of securing uninjured specimens. As regards some species of green plants, and especially the genus *Enteromorpha*, among which there are two or three graceful and somewhat rare species, I have been fortunate during the two last seasons in meeting with several, and among them some remarkably beautiful specimens of two varieties of *Enteromorpha clathrata*. One is known as *Enteromorpha Linkiana*, the other *E. erecta*. These plants are excessively and very delicately branched, and are so unlike the ordinary well-known forms, *E. intestinalis* and *E. compressa*, that inexperienced collectors have often applied to me for assistance in naming specimens of *Cladophora*, as they supposed these plants to be, owing to their numerous branches and extremely attenuated ramuli. Indeed, some of

the rarer forms of *Enteromorphæ* are as puzzling to distinguish as some of the *Cladophoræ*. Experience and the microscope are here, as in many other instances, alike indispensable.

Among the various phenomena connected with marine algæ is that of the glaucous tints which appear on the fronds of some species when viewed under the influence of sunlight in shallow water. Those which possess this remarkable property most distinctly are *Padina pavonia*, *Chondrus crispus*, and *Cystoseira ericoides*. The latter species, which upon being drawn out of the water is a brownish-yellow, appears, under water, as though it were painted the most beautiful cerulean blue, or even ultramarine. I have often wondered what is the cause of this iridescence, which in the genus *Cystoseira* is peculiar to the species *ericoides*, or the heath-like *Cystoseira*. I have sought for an explanation of the marvel in vain, and begin to suspect that a series of chemical experiments alone will lead to a solution of the mystery.

In the early part of last summer, during two or three of my visits to Hope's Nose, I met with a large number of the bladder-like fronds of that curious deep-green plant known as *Rivularia nitida*. They were attached to the sides and upper surfaces of two large rocks near high-water mark. Not requiring any specimens of this plant, I left the whole quantity undisturbed; but this season I did not meet with a single frond, and now, of course, I regret my forbearance, for the plant is rather rare, and it is always agreeable to be able to furnish acquaintances with specimens of rarities. Near the rocks on which the Rivularia was growing, there is a large pool at low-water mark (partly overshadowed by high rocks on three sides), in which I have often enjoyed a swim as the tide was rising, and in which I had the opportunity of witnessing an instance of the extraordinary rapidity of growth in the large species of *Laminaria*, commonly known as "Sea-furbelows." Three years ago, when I first bathed in this pool, the bottom was quite full of large plants of *Laminaria digitata*, but no specimen of *L. bulbosa*, or Sea-furbelows. The following season I was surprised to find several: one of them was a monster, and as its long puckered stem and waving laciniated frond interfered with my natatorial enjoyment, I took the trouble to pull the great plant away from its place of growth. The bulbous root was bigger than both my fists, the large puckered stem was over four feet in length, and the numerous laciniations which crowned the stem, when spread out, formed a circle about 12 ft. in circumference. Even admitting that this plant arose from an old root-stock, unseen by me the season before, the whole plant must have been the growth of little more than six months. In the same pool where this great oarweed was grown, I observed specimens of the deep-water plants *Desmarestia aculeata* and *D. ligulata*. They were growing side by side on a portion of the rock some distance under the over-hanging ledges, and so they were out of reach; the wash of the sea there being so strong, that even at low water there is no time to creep under and make a grasp at the plants before the wave comes up and deluges one, as I have experienced to my discomfort more than once. I saw both species of the *Desmarestia* there last year, but this season I had no opportunity of visiting the place when the tide was favourable for a search, and so I am not aware whether those rare plants are still growing in their former habitat. One other very interesting plant remains to be mentioned, and that is *Callophyllis laciniata*, formerly *Rhodymenia laciniata*. This beautiful species is perennial, and it is also propagated by tetraspores, which are produced in cloudy patches on various parts of its membranous fronds, and by spores which are developed in proper leaflets put forth from the margins of the laciniations for this special purpose. I have frequently picked up fragments of this species on the Abbey Rocks in Torbay and at Paignton; but this spring I found it at Meadfoot, east of Torbay,—on *one* occasion with tetraspores, which is the rarest form of fructification, and soon afterwards I was fortunate in finding a very highly-coloured specimen with the spore-bearing leaflets, besides numerous barren specimens. What it is which causes some species to put forth the primary form of fructification, and others to as constantly produce the secondary, or tetrasporic form, is among those mysteries of nature which prevail in the Cryptogamia, or flowerless plants, and which we at present are bound to recognize, though the wisest among us cannot explain.

Wide is the field for speculation, but narrow and limited is our knowledge, in this, as in many other departments of natural history. The more I reflect on these things, the more I am tempted to think, write, or speak; but it is time for me to ask others what *they* think, and—"I pause for a reply."

THE MANTIS, OR PRAYING INSECT.

THIS insect, about which "E.C." makes inquiries at p. 215, is exceedingly interesting from many points of view, and well deserves a passing notice. By some modern systematists the genus is placed in the order Orthoptera, by others among the Dictyoptera. In any case it must take rank near the wonderful stick-and-leaf insects, with which indeed it was confounded by the earlier naturalists.

The external appearance of the Mantis is so singular, and they offer so many peculiarities of structure, that they may be easily recognized among their congeners. The long, narrow body, the wing-cases traversed by numerous veinlets and embracing

the sides of the abdomen, the anterior feet unusually long and flattened, and made for the purpose of capturing and retaining prey, all these form a combination of characters not met with in any other group of insects.

The remarkable form of fore foot, it may be mentioned *en passant*, in which the lower half is capable of being drawn back and pressed closely against the upper portion, so as to form a veritable pair of pincers, is not unique. It occurs in a Neuropterous species, Mantispa, which is spread over Middle Europe, Russia, &c.; and it crops up again in the Mantis shrimp (*Squilla mantis*, F.), a crustacean not uncommon in the Mediterranean.

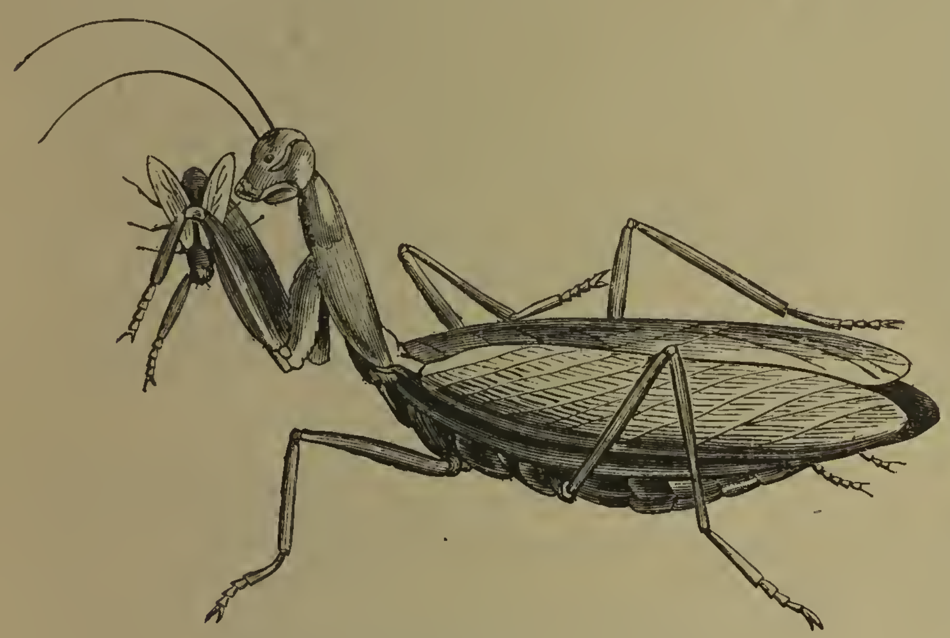

Fig. 148. Praying Mantis (Male insect).

The movements of the praying insect are exceedingly slow and deliberate; in fact, the animal trusts more to cunning and address than to speed in the pursuit of its prey, remaining motionless for hours on a twig or branch, waiting quietly until some incautious insect passes within reach of its long sickle-like forceps, one of which is immediately thrust forward, grasping the victim in an embrace which no struggles can tear asunder. Should the insect fail in its object, it resumes its former position, and patiently awaits the advent of another unfortunate.

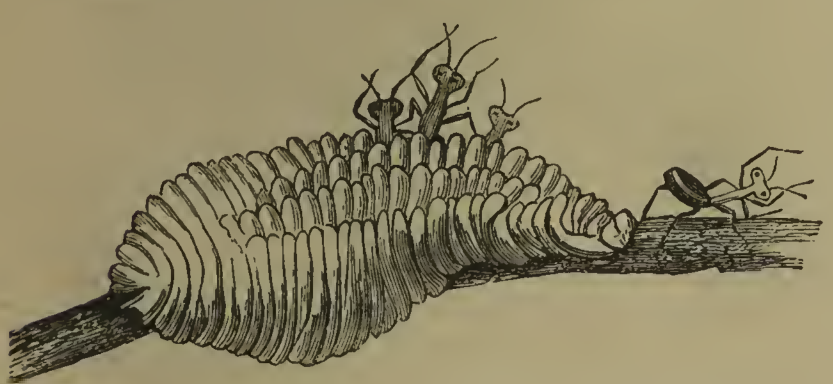

Fig. 149. Praying Mantis (female), with capsule of eggs, from which the young are escaping.

The attitude of the Mantis while thus keeping watch is very singular. With the head and thorax thrown well back, instead of on a level with the rest of the body, as is usually the case, with the long abdomen resting on the four hinder legs only, and with the two forelegs raised upwards and crossed over each other, its appearance long since drew the attention of passers-by and caused them to look upon it as something strange and unnatural. What could the upraised and crossed forelegs indicate but an attitude of devotion? So reasoned our illogical forefathers, and in consequence the animal received various names bearing on this wonderful theory, which have been universally adopted. With the French it is the Prega-Diou (*Prie-Dieu*), Souva-Dios, and Le Prêcheur; with the Germans it is Gottesanbeterin; while English-speaking nations have dubbed it the Praying Insect. Naturalists have aided in propagating the superstition by giving names to the different species, which imply some kind of sanctity; thus we have Mantis oratoria, religiosa, superstitiosa, and so forth. In the middle ages the belief in the semi-divine nature of this insect appears to have been unbounded. The great S. Francis Xavier is said to have held a conversation with one, which he came across in a forest, and to have induced it to chant a hymn! Mouffet, a writer on natural history of the 17th century, in describing the common Mantis of Southern France with which he was well acquainted (*M. religiosa*, L.), speaks of its habit of raising its forelegs, and then says, "If a child on meeting one of these animals should inquire the way, it will immediately point it out, extending one of its legs in the right direction." The historian gravely adds, with an evident air of complete conviction, "Rarely, if ever, does the creature make a mistake."

Nor was this feeling of veneration confined to the nations of Europe. At the present day (and doubtless it was the same in old times also) a Mantis is an object of worship with certain tribes of North Africa. Sparmann also tells us ("Travels in Africa") that in the southern part of the same continent it is venerated by the Hottentots; and that should one of these insects chance to settle on an individual, he is looked upon in the light of a saint, and as specially favoured by Heaven.

In spite of their divine attribute, all the species of Mantis are remarkable for that very human failing—a propensity to slaughter their fellows—like "the mighty murderers of mankind, they who in sport whole kingdoms slay; or they who to the tottering pinnacle of power waded through seas of blood." (R. Glyn: "The Day of Judgment.")

If a number of these insects are placed together in a box, forthwith a "free fight" commences, and before many minutes have elapsed the weakest have been compelled to succumb. And not only do they slay their brethren, but eat them afterwards. Should the mixed company consist of males and

females, woe to the former! Here, if not among men and women, the gentlemen belong to the weaker sex, and are quickly put out of the way by their termagant wives, who then as speedily turn their arms against each other. "We have watched the habits of the Mantis (observes E. Blanchard in his "Histoire des Insectes") during several months, and find that they can support a condition of famine for a long period: I allude particularly to *Mantis religiosa* and *Empusa pauperata*. On presenting them with a number of flies, after depriving them of food for several days, they would devour seven or eight in a few seconds, but leave the rest undisturbed until the following day.

Near the equator it would seem the ferocity of these creatures incites them to the capture of animals not generally considered legitimate insect booty, as I gather from the following relation, taken from Taschenberg's "Leben der Insekten." "Burmeister describes a species of Mantis (*M. argentina*, Burm.) from Buenos Ayres, about three inches long and of a light green colour, of which he records a most interesting anecdote, on the authority of an Englishman, by name Hudson, in whose veracity he has the utmost confidence. Mr. Hudson was sitting one evening, between eight and nine o'clock, outside the door of his residence, a villa in the neighbourhood of Buenos Ayres, when his attention was called to a small bird, *Serpopahga subcristata*, which was shrieking and fluttering on a bough over his head. Curious to ascertain the cause of the disturbance, Mr. Hudson procured a ladder, and having ascended, a remarkable sight met his view. The bird had been seized by a female Mantis, which, while it retained its hold on the tree with its four hind legs, held the bird with so firm a grasp round the neck by means of its long forelegs that the heads of the two animals were closely pressed together. The skin of the Mantis was torn to tatters (*in Fetzen zerrissen*), and the head picked open by the bird; but whether this had occurred before or during the combat does not appear. Of the fact itself Burmeister was well able to judge, for Mr. Hudson transmitted to him both the insect and the bird, which had been so strangely captured."

The various species of Mantis are scattered widely over the face of the earth, from the equator to the middle of Europe. *Mantis religiosa* has been found in the neighbourhood of Vienna; and both it and *M. oratoria* inhabit the forest of Fontainebleau, just south of Paris.

Empusa differs from the true Mantids in having the upper part of the head prolonged into a kind of upright horn; the antennæ too of the male insects are beautifully pectinated. *Empusa gongylodes*, Ill. resides in India, *E. pauperata*, Ill., in Southern Europe and North Africa.

Itchen Abbas. W. W. SPICER.

DR. KINAHAN ON GUANO DEPOSITS OF THE CHINCHAS ISLANDS.

ON account of the gradual diminution of guano, the origin of the deposits is interesting. It s generally supposed that guano is a large accumulation of the excrements of sea-birds; but in a paper published in the "Journal of the Royal Dublin Society," July, 1856, the late J. R. Kinahan, M.B., M.R.I.A., proved that such is not the origin of the guano on the Chinchas Islands, Peru, and the following is an epitome of this author's paper on the subject :—

After a sojourn of some months on the coast of Peru, and a careful examination of the guano deposits, my observations there have led me to reject almost entirely the commonly received opinion that this substance owes its origin to the deposits of sea-fowl, though I would not for a moment assert the same of all guano; as the great difference observable between, for instance, the Ichaboe and Peruvian guanos would seem to point to a different origin of those deposits.

The Chinchas Islands are three in number, and lie about 12 miles off the coast of the mainland, in latitude 13° 44′ south, and longitude 76° 13′ west, constituting one of the rocky groups which here stud the ocean. In their general physical character they resemble each other, all being surrounded for the greater part by precipitous, generally inaccessible cliffs, with one or more sandy bays on each island; the latter are, however, in most cases, unapproachable by boats, on account of the surf and the rocks which bar their entrances.

Rising gradually up from the edge of the highest cliffs, some in places over 200 feet high, which for the most part are at the eastern end of the islands, are the guano-beds. This deposit covers the greater part of the sea-faces of the islands, but leaving certain headlands completely bare,—the bare knolls varying much in their proportionate height and size. On the north island the guano deposits occur as a long ridge, with lateral spurs, its greatest thickness being about 200 feet, and sloping suddenly down towards the sandy bays already mentioned. These hills are all stratified, the strata running horizontally, and varying in their colour and size, being from one to about six inches thick, and from a dirty white to a darkish brown in colour. In the interior of the hills the guano is dry, and so hard as to require the pick and shovel, while on the surface it is generally loose and friable, being loosest on the sides of the hills nearest the sandy coves; but the strata of one hill appear as though they had once been continuous with those of the others. The underlying rocks of which the original islands are formed, are dark red porphyritic granite, overlaid in places by a coarse sand-

stone. On those parts of the island which are bare of guano there is a *thin white layer* of birds' dung, to be again referred to; and on this island is a small bed of fossilized shells.

No plants of any kind, with the exception of patches of *chlorococcus*, grow on the north island; sea-weeds are numerous however. In addition to the mules, dogs, cats, pigs, and fowl belonging to the inhabitants, the island swarms with rats, lizards of several species, flies, scorpions (of which I found the exuviæ of two small specimens under the guano), *Chelifer fasciatus* (?), and one or two coleoptera. On the sea-rocks are land-crabs belonging to the family *Grapsus;* numerous birds, such as the pelican, cormorant, tern, prion, mutton-bird, a little land-bird like a grackle, a long red-billed wader like an oyster-opener in its habits and note, Mother Carey, cape pigeon, gannet, diver, and one albatross. Penguins were formerly common, but are now rare about the Chinchas, though said to be still abundant at Balistas, one of the neighbouring groups. In the circumambient seas spermaceti whales are occasionally seen, and finbacks, often of great size, are quite common at times among the shipping; but the most numerous and important of all these animals are the sea-lions and seals; though it is difficult to obtain accurate information about them, as shooting is not allowed on the island; but the first seems to be *Otaria leonina* (Gray's catalogue), or *Phoca leonina* (Linnæus). The sea-lions are still numerous about the islands, in unfrequented parts much more so than in the others, they frequently being upwards of 20 feet in length. On the rocks about the north or middle islands they are now seldom seen, but hundreds may be seen basking on those about the south island. *In* the guano deposit no organic remains are found, except occasionally birds' eggs, which are infiltrated with ammonia, in some cases having their shells quite perfect, in others having them crushed in; and these eggs are only found in or near the edge of the hills. Sometimes, especially after heavy dews, the surface of the guano becomes covered with a white crust of ammonia, the subjacent rocks are infiltrated with the same substance, and parts of the cliffs have an inch or more thick incrustation of an ammoniacal salt. The ancient inhabitants for time immemorial used the guano for manure; and for the fining of silver, the substance used for the latter purpose being made up of the seal's dung or *pod*, which accumulates in great quantities during the breeding season on the rocks where the seals suckle their young.

The middle island, from which about a third of the guano deposit was taken, when visited, closely resembles the north island, but is smaller and more accessible. It is remarkable for having its main ridge of guano crowned by a rocky pinnacle protruding to some height. The guano here is drier, more friable, and lighter than on the north island, while the crabs are remarkably numerous.

In 1855 the south island was the most interesting of the group, as it was uninhabited and the guano deposit untouched. This island is not so easy of access as either of the others, as its one sandy bay is barred by breakers. A landing was effected on a projecting rock joined to the island by a magnificent natural bridge, from which you must clamber up a nearly perpendicular cliff. After passing this you clamber on up a steep hill of guano bored full of galleries by mutton-birds, lizards, &c., and on attaining the summit of the island you find yourself surrounded by dead sea-lions, lying around in a most picturesque confusion—heads and skeletons staring out at you in hundreds in every conceivable attitude. The skins of the lions in a number of cases were but little decayed, much less than their bones, which when buried altogether in the guano quickly disappear. The summit of the hill is nearly level, of some acres in extent, the guano of a rich unctuous brown colour, condensed or caked on the surface, and darker in colour than the summit of the other islands. It slopes slightly towards the cliffs on the sea-side, and very rapidly and abruptly towards the mainland, ending in the sandy cove already mentioned. The guano on the side over the cove is very loose and friable, and the shore below was strewed with whales' teeth and the skeletons, skulls, and carcasses of seals carried in by the sea.

Winding up from the cove around the base of the guano hill was a broad level trackway leading to the summit, tracked the whole way with the spoor of a large sea-lion, whose carcass was to be seen at the top of the hill; and, lying in various places alongside, were the carcasses of other lions which had perished before reaching the summit, most thickly scattered near the top, but very numerous all along. What instinct leads these seals to seek the land when dying,—an invariable rule with them if we may believe the natives,—it would be profitless to inquire, but such appears to be the fact; and these mighty heaps of guano, calculated in 1854 at 8,600,000 tons, but probably more, seem to be but the remains of myriads of decayed seals.

On this island, as on the others, are numerous headlands bare of guano, although the roosting-places of innumerable birds, but covered with a similar white deposit as those previously mentioned on places in the north island. Around this island are a number of detached rocks, many of considerable size; on these, innumerable birds roost, yet there is no guano on any of them, except a few that are frequented by the seals.

Judging from the appearances traceable on this island, it would appear that the guano deposit was formed by layers of seals' dung and decayed seals, the denser and white thin layers being made up of

the former, and the more friable, darker, thicker layers of the latter. These conclusions seem evident from the following:—First, the immense accumulation and peculiar formation of the guano-beds contrasted with the thin white coating of birds' dung seen not merely on the main islands, but also on the detached rocks, many of which are too high out of the water to allow for a moment the supposition that guano, if once formed on them, could have been washed off. Next the evidence of a pressure, greater than that which any trampling of birds could have caused, evidenced by the density of the strata, being nearly as great at the surface as at the base of the hills, showing that it could not have arisen from mere pressure of the superincumbent mass of guano, but which appearance might have been produced by the weight of one of these sea-lions,—much more by a number of them. Next by the appearance presented by the top of the south island, the numerous dead sea-lions actually in the process of becoming guano, as evidenced by an examination of the more recent bodies, the undecayed skins of which contain within them a substance, in appearance at least, identical with the brown guano found on the summit of the hills, and also similar to that in the thicker strata. The absence of the organic remains of birds in the interior of the guano; for though, as already stated, bones appear to decay rapidly, yet feathers resist the action of the guano for a long time. The small quantity, equivocal position (always near or on the surface), and peculiar appearance of the remains of birds at present met with; dried up and turning into a substance as unlike the true guano, or the decomposing seals, as the white deposits on the headlands,—in fact, appearing to be purely of accidental occurrence, and having almost as much to say to the formation of the guano as the lizards and rats which are found along with them. One bird there is a species of spheniscan, that possibly might assist in forming guano; but though this bird is very numerous on various rocky islets along the coast of Peru, yet on none of them is guano found, though they are just as favourably situated for its formation as the Chinchas; and as birds are known to burrow in the guano, the occurrence of birds' eggs in it is easily accounted for. G. H. K.

THE SEA-HORSE.

(*Hippocampus brevirostris.*)

THE establishment of aquaria at the Crystal Palace, Brighton, Manchester, and elsewhere, is likely to develop a large amount of public curiosity in the marvellous creatures which inhabit the great deep, of which the world at large has been in utter ignorance, and of which our best learned scientific men have known but little.

The cuttle-fish with its long tentaculæ and its powerful suckers, its ink-bag, and its long but doubtful history, will continue to have the attention of the student, as well as of the mere lover of the curious. Strange facts connected with the natural history of various fishes are continually being brought to light, and every day adds to the interest of the large aquaria. Marine and fresh-water animals can be studied in what may be called to a large extent their natural conditions, where they may exhibit their peculiar habits and instincts, and live and breed from generation to generation. It will probably be difficult to create these conditions in all cases, but already they are perfect in many. In the latter cases referred to, the student of natural history may sit beside the tanks and test all the conditions of animal life. Such are the advantages of the large aquaria.

Fig. 150. Sea-horse (*Hippocampus brevirostris*).

One of the most interesting events connected with public aquaria has recently been referred to by the press, in connection with the birth of Sea-horses (*Hippocampus brevirostris*) at the temporary tanks of the Manchester Aquarium Co., Limited. It is very doubtful whether such an event ever occurred before in Great Britain, but it is quite certain that it is the first time that the *Hippocampus* has been bred in a public aquarium.*

The Manchester Company, whose chief building is now in the course of erection, have had for some time a large number of these creatures in temporary tanks in a building erected for the reception of such marine and fresh-water animals as do not require a large space, in order to acclimatize them, and have them ready to remove in a healthy condition to their permanent home in the large building.

On Monday, the 21st July, the curator noticed a young *Hippocampus* rise upwards through the water and swim about with great activity,—vertically, as is the custom of the parent. It hovered about the top of the water, occasionally descending an inch or

* Since writing the above, I have a communication from Mr. King, of Great Portland-street, informing me that he has succeeded in breeding the *Hippocampus*.

two, and again soon returning to the top as if for air. The parents, on the contrary, seldom go to the top of the water; with them it is not a necessity. During the day thirteen other young ones left the pouch of the parent and issued forth into the world on their own account. On the two subsequent days other young ones followed the example of the thirteen, until the number amounted to about two hundred, for it was impossible to ascertain the exact number.

The young of the *Hippocampus* are hatched in a pouch, which is in all cases in the tail of the male parent, the ova being placed there by the female as in a nest. It has been supposed that the young occasionally return to the pouch for protection or rest, but I have not been able to ascertain if that be a fact or not.

The young *Hippocampi* are about three-fourths of an inch in length, and singularly exact in their likeness to their parents: the only noticeable difference is that the eyes are unduly prominent; in every other respect, as also in their mode of swimming and peculiarities of habit, they are the counterparts of their seniors. Perhaps in these general remarks I should refer to the greater activity of the young, and their frequent visits to the top of the water.

THOMAS BRITTAIN.

THE FORMATION OF CHLOROPHYLL OR LEAF-GREEN.

THE most superficial observer cannot fail to have noticed, whilst passing through the cultivated districts of this country, that the growing crop on one part of a field is sometimes of a light green, whilst that on another part of the same field, sown at the same time, with the same seed, is of a much darker colour. Those who more carefully examine this phenomenon will discover that this dark green is most frequently produced by a supply of nitrogen to the roots of the plants, and will probably ask themselves the question whether this colour is, as Liebig asserts, an abnormal development of leaf to the injury of the plants, or whether it indicates a healthy, vigorous growth which would produce a heavy crop? It is asserted by most farmers that "like colour so crop," and in the published results of experiments with manures by Messrs. Lawes & Gilbert, of Rothamsted, the correctness of this theory is clearly shown; but as their writings are not studied by many, I will give the result of a few simple experiments which I have made, that I may the more clearly prove this point. In the first of these I grew barley plants in two saucers supplied with ordinary well-water; to one of these I added a few grains of nitrate of soda. This produced no visible increase of colour in the plants to which it was applied; thus showing that the nitrogen contained in nitrate of soda will not produce any more colour in the plants unless they are provided with the other elements which they require. In the second experiment barley was grown in four pots filled with almost pure sand, to the first of which no manure was applied. To the second I added five grains of nitrate of soda, which contains as much nitrogen as the barley could require. In the third pot I placed 10 grains of wood-ashes, which would supply all the inorganic substances necessary for the plants. In the fourth I placed both the five grains of nitrate of soda and 10 gains of ashes; thus providing the plants in this instance with all the requisites to a healthy vigorous growth. When the barley in this last pot had reached the height of 5 inches, and those in pots 1, 2, and 3 were all about 3 inches above the soil, they were destroyed by drought, but a note taken before that time states that the colour of the plants in pots 1, 2, 3 was nearly the same, but those in pot 4 were much darker. In this experiment, therefore, the richest green was obtained in the pot which produced the greatest growth. The third experiment was a repetition of the second, —the same sand, manures, and seed being employed, and in the same proportion as in the last experiment. After a little more than a month's growth, the barley in pots 1, 2, and 3 was about 3 inches in height, and in each of an equally light green tint, while that in pot 4 was 7 inches above the soil and a dark luxuriant colour. It appears, therefore, that the formation of Chlorophyll is in some way directly connected with healthy growth, and is not produced by nitrogen, unless there be a sufficient supply of mineral matters to the roots.

We also know that the green colour of plants depends on light. This may be easily proved by growing some mustard in two pots, one exposed to light, the other placed in the dark; and you will find that those which have been grown in the dark will be of a pale yellow, but those exposed to the sun's influence of a dark green; thus showing that the effect of manures, in producing this colour, either depends on, or influences, the action of light, for without the solar rays the colour cannot be formed.

This naturally leads to the inquiry, what is the chemical action of light? We know that the leaves of plants absorb carbonic dioxide, which, under the influence of light, especially direct sun-light, is *deoxidized*, and the carbon, combining with the substances absorbed by the roots, forms the organic compounds of which the plant consists. This only takes place in light: it therefore appears that light exercises a *deoxidizing* influence. If this be true, it ought to be prejudicial to all chemical actions in which oxygen is absorbed, especially if the substance undergoing oxidation be carbon or any carbonaceous compound.

The action which takes place in germinating seeds is one of oxidation; the starch they contain combines

with oxygen absorbed from the air, forming sugar, and carbonic dioxide is liberated'; it is therefore an action of *oxidation* to which light, if it has a *deoxidizing* influence, ought to be injurious. To satisfy myself that this is the case, I have made several experiments with light, and various seeds placed on moist cotton wool, in all of which those kept in darkness, although their temperature was lower, grew more quickly than those exposed to light. In one of these experiments I carefully measured, when at a certain stage of development, both the plumule or stem and the radicles or roots of the sprouting plant. The average of those placed in the dark was,—the plumule $\frac{3}{4}$ inch, the radicles $1\frac{1}{4}$ inch; of those exposed to light the result was, that the plumule was not visible and the radicles only just emerged from the seed.

The growth of fungi depends on their power of oxidizing the organic substances on which they grow and exhaling carbonic dioxide. Light, therefore, ought to be injurious to them, and we know that they prefer the shade to the sunshine, and always, I believe, come out of the ground in the night. If two similar pieces of pasty matter be placed in two cups, and one exposed to light, the other placed in the dark, after a few weeks the latter will be found to be much more thickly covered with mould fungi than the other.

The effect of light on dyed fabrics is another illustration of its deoxidizing influence. Almost all the darker dyed materials are changed to a lighter colour by exposure to sun-light:—Black becomes blue; blue, green; and green is changed to yellow. The same result is obtained by the action of an acid. In the case of one important dye, viz. indigo, this change has been carefully investigated. This substance is obtained from the almost colourless sap of several species of the Indigofera, a genus of plants which grow principally in warm climates. The leaves of these plants are placed in water and allowed to ferment; a yellow substance is dissolved out, which, combining with the oxygen of the air, becomes deep blue, and under the influence of a deoxidizing agent is again converted into the nearly colourless form. These two substances have the composition represented by the following formulæ:—

Blue indigo .... $C16. H10. N2. O. O.$

White indigo .... $C16. H10. N2. O. H2. O.$

Thus we see that the change of dyed fabrics from blue to yellow and white is one of hydration or deoxidation, and as it is produced by light, it appears that in this case also it exercises a deoxidizing influence.

But the most familiar example of the combination of oxygen with carbon is ordinary combustion. Combustion, whether it be of coal, wood, gas, tallow, &c., consists of the oxidation of the carbon and hydrogen they contain; therefore, if my view be correct, light ought to interfere with this process. We know that it is asserted, by those whose fire-places are so situated that the sun can shine on them, that its rays do put the fire out; but as some attribute this phenomenon to ocular illusion, I have attempted to decide the question by some experiments on candles. The first two experiments were conducted rather carelessly, but, as in both these the candle burnt in darkness consumed more tallow than that exposed to light, I was induced to make some trials with greater care. For this I employed night-lights, for, as they burn more slowly, I thought there would be a greater opportunity for light to influence the result. These, after being carefully weighed, were placed, one in each of two equal-sized boxes, the lid of one of these being substituded by a glass plate, and equal-sized ventilation-holes being bored in each. The boxes so arranged were placed at a window, and after four hours' exposure the lights were extinguished and again weighed.

In the first experiment there was scarcely any sunshine; the result, therefore, as far as it was affected by light, was produced by diffused day-light. In these circumstances the night-light in the *dark* burnt 20 per cent. faster than that exposed.

In the second experiment there was occasionally a gleam of sunshine, which apparently influenced the result, for in this instance that in the *dark* consumed 25 per cent. more tallow than that in the light, which is an increase of 5 per cent., supposed to be due to the injurious effect of the occasional sunshine to which that under the glass was exposed. I regret that, owing to the late cloudy weather, I have been unable to repeat these experiments; for although in five experiments I have obtained a similar result, yet I cannot be confident that it is not due to some extraneous cause of which I am not aware; but if they are reliable, they prove unmistakably that in combustion also light exercises a deoxidizing influence. I have endeavoured to account for this by supposing it to be due to vibration communicated to the carbon by the particles of luminous ether, which convey light. To illustrate this let us imagine two balls, one to represent carbon, the other oxygen. The light impinging upon the carbon ball puts it in a state of vibration, thereby hindering its combination with the oxygen.

Having then shown that the action of light is one of deoxidation, we will proceed to examine its effect on Chlorophyll.

We know that in autumn, when the flow of sap to the leaves is arrested, their colour is changed to yellow. That this is the result of the action of light may be proved by two simple experiments. If two green leaves be pressed, one in the dark, the other under glass, that in the dark will remain almost the same colour, whilst that exposed to the influence of light will be turned yellow. If an alcoholic solution of Chlorophyll (produced by placing bruised leaves

in spirits of wine) be poured into two test-tubes, and one be exposed to light, the other being placed in the dark, that in the latter will retain its beautiful green colour, but in the tube in the light the colour will be changed to a yellow. The effect of light on Chlorophyll, therefore, is to convert it to a yellow substance; and that this change is one of deoxidation may be shown by placing a drop of acid on a leaf. We know that the action of a strong acid on organic substances is to deoxidize them, and we see that, as we might have anticipated, it turns the portion of the leaf on which it was placed to the same yellow colour as is produced by light. After this we shall not be surprised to learn that Sachs attributes the presence of the green substance, or Chlorophyll, to the oxidation of a yellow substance, or Leucophyll, which has been formed by the plant; and if we compare this theory with the process which we have seen goes on in the formation of the blue from the white indigo, we shall see that the result is in both cases due to oxidation. But we have seen that the tendency of light is to deoxidize the substances on which it impinges; how then is it possible that Chlorophyll should be formed by the sun's influence?

In a healthy plant the atmosphere has free access, by means of stomata or pores in the leaf, to all parts of its structure, and we know that, under the influence of light, the carbonic dioxide it contains is deoxidized, the carbon being assimilated but the oxygen liberated. Is it absurd then, to suppose that this oxygen liberated by light from the carbonic dioxide, being in immediate contact with the Leucophyll, should combine with it in producing Chlorophyll? To illustrate this theory let us take the case of the barley in the pots mentioned above. The plants in pot 1, after they had exhausted the supply of mineral and nitrogenous substances supplied by the seed, would attempt to obtain them from the sand; but as sand does not contain these elements, the leaves could only produce substances such as starch and sugar, which consist only of carbon and the elements of water; but as a plant cannot grow without the nitrogenous compounds and those substances which contain the mineral matters, the action of the leaves must soon become very feeble, and very little oxygen be liberated from carbonic dioxide. Light would then commence deoxidizing the Chlorophyll, reducing it to the yellow state. In pots 2 and 3, for the want, in one case, of mineral matters, in the other of nitrogen, the deoxidation of carbonic dioxide would cease, and in the absence of the excess of oxygen light would destroy the colour. But in the case of the plants in pot 4, as all the substances essential to their growth were liberally supplied, a rapid absorption and deoxidation of carbonic dioxide was kept up, thereby supplying a large quantity of oxygen for the oxidation of the Leucophyll in the leaves, converting it into the bright green Chlorophyll.

Ipswich. A. HARWOOD.

QUEEN BEES.

EVERYTHING relating to the habits and economy of the honey-bee is so interesting, that we are happy to have it in our power to report the latest observations of the eminent apiarian, Major Munn, on the queen of this valuable insect. At a meeting of the East Kent Natural History Society, held at Canterbury, Sept. 3, he produced no less than two dozen live queens of the honey-bee, and gave practical demonstrations as follows:—

Stinging of Queen Bees.—Major Munn proceeded at once to give most conclusive evidence in favour of the fact that the queen bee does not and cannot sting. The most conclusive evidence in favour of this fact was afforded by the handling of the queens both by the Major himself and by other members of the Society; for in no case did these insects sting; not from a want of will to do so, however, since they were seen to put out their stings and attempt to inject their poison into the hand which held them in captivity. But in no case were they able to penetrate with the sting the skin of the human body.

Structure of the Sting.—The Major then referred to the comparative structure of the sting in the queen and worker bees, held as affording an explanation of the inability of the queen to sting. As shown by Mr. George Gulliver (of Pembroke College, Oxford), the sting of the worker is very sharp, straight, and provided with from eight to ten barbs, whilst the sting of the queen is curved, much blunter, and provided with but few barbs. These differences were shown by extemporaneous dissections.

Bee-fights.—It having been proved that the queen bee is unable to sting, the question naturally arises, "But how does she kill her rival, since it is a well-known fact that two queens will fight like game-cocks"? This question the Major proceeded to set at rest practically by placing two queens in a glass bottle, in order that their manner of fighting might be witnessed by the society. During the fight, which was watched with the most intense interest, each queen was seen to attempt to disable her rival as much as possible by means of her powerful mandibles, an account of the structure of which has been given by Major Munn. At the same time she feels about with her sting, which is totally unable to penetrate the integument of her rival, till she finds one of the spiracles, that is, one of the respiratory apertures, of her rival, through which she injects her poison, with a rapidly fatal effect, into the respiratory system.

Thomas Wildman.—During the progress of the fight, which occupied some time, Major Munn gave a most amusing account of the tricks of Thomas Wildman, who flourished towards the latter part of

the last century, and had at that time the reputation of having the most surprising command over bees. He was accustomed to exhibit himself, surrounded with his bees, before the King and divers of the nobility. "Thus fortified, bulldogs have been set at him by his own desire, when he repulsed them by detaching one or two bees, to the astonishment of all who have seen him." He was offered a hundred guineas as a reward if he would disclose the secret, which he refused to do.

All the tricks of this man were explained by Major Munn. Wildman's apparent command over bees was simply owing to his using only queen bees; and these could not sting him. Possessed of his secret, he could handle the bees fearlessly and detach them against the dogs, who, when the insects were entangled in their hair, were frightened by their buzzing.

COMPARATIVE SIZE OF POLLEN-GRAINS.

$\frac{4}{10}$ × 120.

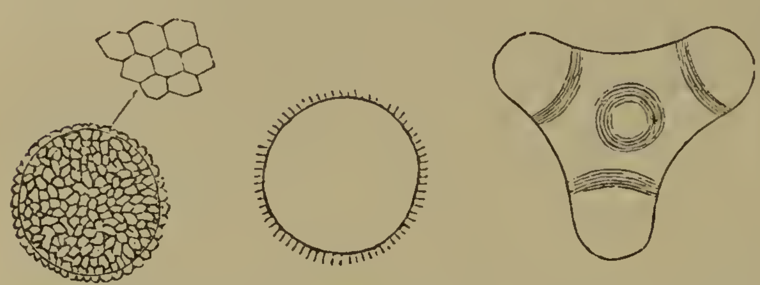

Fig. 151. Clematis. Fig. 152. Hollyhock. Fig. 153. Œnothera.

Fig. 154. Heath. Fig. 155. Heartsease. Fig. 156. Salvia. Fig. 157. Dielytra.

Fig. 158. Poinsettia. Fig. 159. Coreopsis. Fig. 160. Vetch. Fig. 161. Hyacinth.

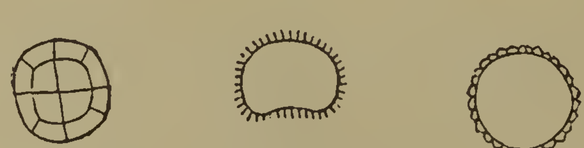

Fig. 162. Acacia. Fig. 163. Pelargonium. Fig. 164. Cactus.

THE comparative sizes of pollen-grains may, perhaps, be of some interest, and though I am an indifferent draughtsman, your readers may possibly recognize my attempts at delineating them. The pollen of the clematis presents an hexagonal structure, which it is difficult to represent on so small a scale. The figures are all drawn under the camera with $\frac{4}{10}$ objective and A ocular.

R. H. N. B.

THE WALNUT MOTH.

(*Attacus luna*, Fabr.)

By Charles C. Abbott, M.D.

A LONG time ago it seems now, although really but a few short months, while I was wandering about, with only a small bottle of alcohol, wherewith to preserve anything curious that I might happen to come across—for I was not systematically hunting for specimens of any kind—I spied on a low branch of a walnut (*Juglans*) a very pretty caterpillar. My first impulse was to pickle it; but then it occurred to me, the colours will all fade; and so, having no glycerine mixture at hand, I concluded to simply watch it, and see how and when it would spin its cocoon.

This caterpillar was "pale bluish-green,—a yellow stripe on each side of the body; between each segment of the back a line of yellow; on each segment five or six small pearly protuberances, tinged with purple or red, having a few hairs. At the posterior end three brown spots, edged above with yellow." (Morris.)

This larva, when we found it, seemed very indisposed to move, but stretched himself out to about three inches when we slightly pricked him with a stiff blade of grass.

It evidently was anxious to begin its cocoon, and we were very willing that it should, and anxious to observe the *modus operandi*. This is not so very easy to do, however, for the fine hair-like silk first thrown out goes here and there, just as directed by the caterpillar, and the first real indication of what was going on, that we had, was in noticing two leaves slowly approaching each other, and presently a third coming close to these. Close examination showed a multiplicity of silken threads binding these leaves pretty firmly together; firmly enough to keep them in position under all ordinary circumstances of wind and weather. We had here to leave the caterpillar and return home. It was a week before we went again to the tree, and then, on reaching the spot, we found a large oval cocoon snugly fixed between the three leaves, spun of very fine white silk, and everything in prime order, according to the ideas of his larva-ship. We noted down time and place, and determined to be around when the silken curtain should rise (*split*, rather) on a very different scene.

Our very proper intentions, however, were not exactly carried out, but on the 17th of July of this year, while I was standing near this very walnut-tree, my attention was drawn to a lad who was wildly jumping about in the tall grass, waving his hat and hand at some lively but, to me, unknown object. A shout immediately after I first noticed him, told me Willie had caught something strange; and when I reached him, a fine *Attacus luna* was

struggling between his thumb and finger. In a moment I recalled the caterpillar and its white silken cocoon; and going to the tree, found the cocoon just emptied, I should say, and this magnificent moth, the transformed green caterpillar of months

Fig. 165. The Walnut Moth (*Attacus luna*), female; from a specimen in the British Museum.

gone by. The dark purple band at the front of the superior wings; the clear yellow-green of the wings themselves; the eye-like spots, and pure white body with purple legs, altogether make this "fly" our very handsomest insect. So, at least, I think; and I wish every one of my English readers who loves butterflies had a fac-simile of the beautiful *Attacus luna* now lying before me.

THE ROBBER CRAB.

(*Birgus latro.*)

It is almost necessary to form some idea of the charming localities met with only in the larger islands of the Pacific, in order fully to understand the interesting habits of the Robber Crab (*Birgus latro*), which has its abode among them. This curious crustacean, which is also found on the islands of the Indian Ocean, is one of those crabs which can exist for a long time on land, and only pay occasional visits to the briny deep. Some observers incline to think that once during the twenty-four hours the Robber Crab enters the ocean, in order to fill the reservoirs on either side of the cephalothorax, by means of which the gills

Fig. 166. The Robber Crab (*Birgus latro*).

are kept moist; other authorities make his visits less frequent, and probably with greater truth; but there is no doubt that now and then he recruits his energies by a sea bath. The crab itself is of a

yellowish-brown colour, about two feet in length, and when walking is elevated nearly a foot above the ground on its four principal legs. It forms deep burrows and intricate excavations in the sand underneath the roots of the palm-trees, and when once in its hole is by no means easy to dislodge. Its principal food consists of cocoa-nuts, and it is even said to climb the tall trees, in order to procure its favourite delicacy. But this report lacks confirmation, and rests principally, if not altogether, on the statements of the natives, who are no doubt as proud of their crabs and their achievements, as a Londoner of his "lions" and their peculiarities; and not without reason, for as we have said, *B. latro* is a most interesting and eccentric individual, especially with reference to cocoa-nuts. Now it must be clearly understood that when pendent from their native boughs, the nuts do not present exactly the same appearance as when artificially fixed on the extremities of sticks to be knocked down by "good shots" at so much a throw. In its original state the nut is enclosed in a fibrous envelope of great strength and toughness, so much so, that any other than the Robber Crab might well despair of being able to tear it open. But by him the task is accomplished with ease; his muscular claws make short work of the cocoa-nut fibres, and after a few vigorous efforts, the coveted nut is successfully extracted. But even at this stage the operation is only partially accomplished, for the milky substance is still inclosed by a thick shell,—a shell, which but for a little natural help would prove a poser even to *B. latro*. In point of fact appearances are deceptive, and the barrier seemingly so strong, has at least three weak points; namely the depressions at one end of the nut, which are supposed to bear some resemblance to a monkey's face. It is not necessary to affirm that these depressions were placed there solely for the convenience of the Robber Crab, but they are none the less of the highest importance to him. With two or three well-directed blows from his larger claws, he contrives to break through the shell at one of these spots, and then, inserting one of the smaller limbs, he works it round and round in the interior of the nut and thus manages to scoop out the juicy contents. What a comical spectacle must they present,—the crab and the cocoa-nut! We can almost picture it for ourselves: a sandy beach overshadowed by pleasant palms, and washed by the waters of the broad lagoon; a number of curious-looking creatures, some scuttling over the strand bearing aloft in their claws the precious wind-falls, others busily husking and tapping them. But the Robber Crab has an eye for future use, as well as for present enjoyment, and does not care to throw away valuable material as mere refuse. When he has regaled himself to his heart's content on the sweets contained in the nut, he carefully collects the torn pieces of the outer husk, and works them about between his claws, until they are reduced to the consistency of tow or oakum. After carding the fibre, the next operation is to transport and deposit it in some far-removed corner of his burrowed habitation beneath the sand, where it serves him as a couch during the periods of moulting or shell-changing. These moultings are trials to which all crabs and lobsters are subject. They are necessary, because the shell once formed never grows larger, and consequently so long as the animal within is increasing in size, it continually needs fresh shells. Crabs find the process of casting the old covering very unpleasant, inasmuch as it renders them completely helpless for a few days. The carded cocoa-nut forms no doubt a soft and comfortable mat for *B. latro*, when he has shed his old coat, and is waiting until a new covering shall have hardened about his defenceless limbs. The flesh of the Robber is considered a delicacy by the inhabitants of the Samoan group of islands, who accordingly make organized expeditions to hunt him,—if hunting it can be called, for the only method of capture is by digging deep down into the burrows. Even then the task is no easy one; a crab unearthed is not a crab disarmed, and when apparently strongly bound, it will often snap the restraining cords with the strength of a Hercules, and "skedaddle,"—a very expressive word, when used for the movements of this creature. The islanders have another object in opening the nests of the "Ou-Ou," as they call *B. latro*,—the appropriation of the stores of carded fibre, already mentioned; this they use to calk the seams of their canoes, and for other domestic purposes.

The Robber Crab does not subsist wholly on cocoa-nuts, nor reside all the year round in holes excavated beneath the sand; at certain seasons he finds it expedient, for reasons which we have stated before, to change his domicile, and take a trip to the "salt-sea wave." At such seasons he finds the benefit derived from a bath in the billows considerably enhanced by a change of diet; so he lives, like an epicure, on shell-fish. It is a sad time for the mollusca in the immediate vicinity of his marine residence. Every day a number of hapless individuals are taken from the scene of their daily vocations, and their sorrowing acquaintance see their forms no more—themselves perhaps destined to disappear in a similar fashion on the morrow,—and all to glut the appetite of a Robber Crab. What terror contorts their miserable snail-faces when they hear of the arrival of the mighty Molluscophagus; how they long for the good old times when each could sit in safety under his own fig-tree, and his own vine, or, to speak more correctly, beneath his own seaweed, and in his private pool! But such regrets are vain; the enemy is upon them, and however closely they may shut the door

of the house, it avails them nothing. In a moment the operculum is broken through, and the wretched inhabitant seized, drawn out, and devoured. Nor, if we may believe report, does the ruthless crustacean stop here, but having perpetrated a gross injury, he proceeds to add a grosser insult. In plain words, he inserts a claw in the empty shell of the departed mollusk, and, elevating it high in the air, executes a sort of war-dance of exultation. Altogether, it cannot be denied that the Robber Crab is not, and never will be, a respectable member of the order to which he belongs. One good point, and one only, does he possess; he is, at any rate, frugally provident. This is proved beyond controversy, by his industry in carding and storing the cocoa-nut husks. From no other point of view can any good be discerned in his character. If, under the guise of prose, we might venture to smuggle in a line of poetry, *Birgus latro* is aptly described as carrying a name "linked with one virtue and a thousand crimes." Nevertheless he is a very interesting animal, and one thoroughly typical of the sunny islands in which he makes his abode.

We do not possess in our British fauna any crab so monstrous, either in size or wickedness, as the Robber, nor indeed any so remarkable. Still, there are few, if any, of our native crustacea which will not amply repay the attention of the naturalist. Crabs are so curious in their habits, curious in their movements, curious in their forms, that the very sight of them invariably creates in our minds an almost unaccountable interest. With the help of such books as "Half-hours at the Seaside," much information may be gained, and many pleasant hours passed, whenever we are able to take a trip to the coast.

Crustaceans are no doubt for the most part rather crooked creatures, but it is possible to observe their habits in an upright spirit; and such is the happy vivacity which reigns over all zoological pursuits, that the student of crabs, though naturally "crabby," is not at all likely to become crabbed. EDWARD C. LEFROY.

NEW BOOKS.*

THE summer days have gradually dwindled away, and the long, cheerful winter evenings are coming on us. The work of the naturalist changes from outdoors to indoors. By the bright study fire, surrounded with English comforts, he may compare his summer work and extend his knowledge by consultation of authorities. New books will begin to pour in upon him, whose study will wile away the pleasant hours till the return of summer.

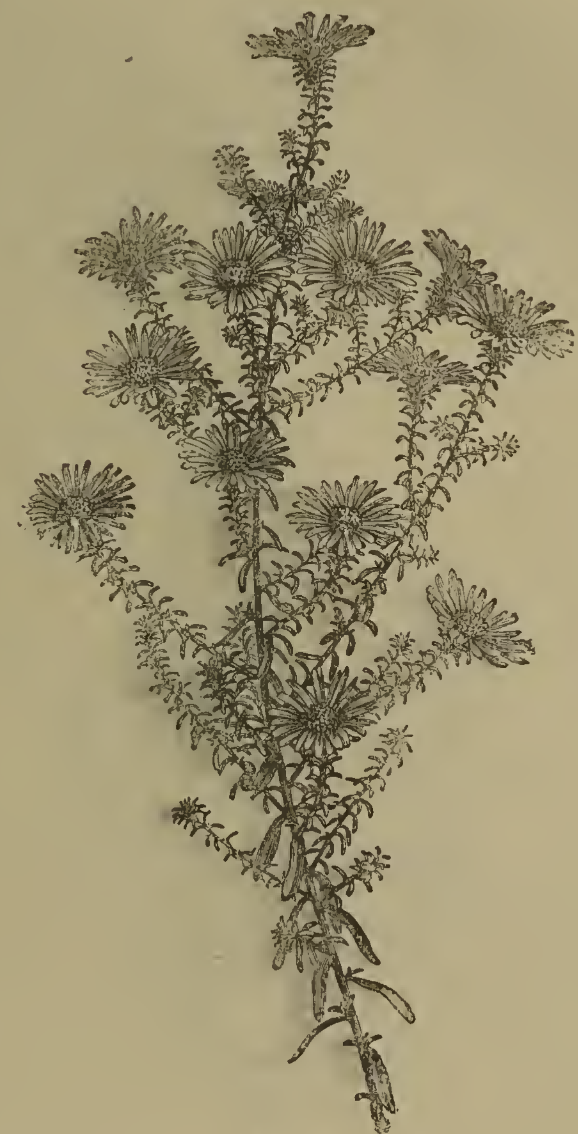

Fig. 167. *Aster grandiflorus*, ½ nat. size, N. America; from Hemsley's "Handbook."

The latter is not usually the season for the publication of new books, unless they be of such a character as is likely to influence our various pursuits. We have received several volumes for

Fig. 168. *Azalea lilliflora*, ⅓ nat. size, Hardy plant, China.

* "Handbook of Hardy Trees, Shrubs, and Herbaceous Plants." Based on the French work of Messrs. Decaisne and Naudin, by W. B. Hemsley. London: Longmans.

"The Philosophy of Evolution." By B. T. Lowne, F.L.S. London: Van Voorst.

"Familiar History of British Fishes." By Frank Buckland. London: Society for Promoting Christian Knowledge.

"Chronos: Mother Earth's Biography." By W. Wood, M.D. London: Trübner & Co.

"Half-hours in the Green Lanes." By J. E. Taylor, F.L.S. London: Hardwicke.

review during the past few months, of varied worth, a notice of which may be deemed acceptable. The first on our list is the "Handbook of Hardy Trees, Shrubs, and Herbaceous Plants," by W. B. Hemsley, formerly an assistant at the Herbarium of the Kew Gardens. This is a copious volume, of upwards of six hundred pages, illustrated by nearly three hundred first-class woodcuts, many of them by Riocreux and Leblanc. The text is based on the well-known French work of Decaisne and Naudin. It deals with the descriptions, native countries, &c., of a selection of the best species of hardy plants in cultivation, together with their cultural details, comparative hardiness, and suit-

Fig. 169. *Clarkia pulchella*, ⅓ nat. size, North-west America.

ability for different situations. This work is simply and plainly written, without being popularly discursive; and the author has evidently felt that his work was too large for him to indulge in anything but a serious and earnest treatment of it. The greatest prominence is given to descriptive garden botany, a department that has been, without doubt, much behind others. Although Mr. Hemsley has evidently made a free use of the original French work, that fact does not detract from the genuine originality of the present work, as regards his treatment of it. It bears the marks of being thoroughly understood and delighted in by its writer, and we need hardly say that to the horticulturist, whether practical or amateur, it is an invaluable manual. To the English botanist, familiar with the appearances of our numerous garden plants, to many of which there is attached an almost historical interest, this book will be very acceptable. And, as a general work of reference on all the subjects it professes to teach, we believe there is none like it in the English language.

Whatever Mr. Frank Buckland has to say about fishes (and, for the matter of that, about anything else that lives in the water) is sure to be listened to. He talks like a man to whom the fishes are old friends, and who make known to him the secrets of their habits even more intimately than they did to Charles Kingsley's "Water Babies!" Hence a *Familiar* History of British Fishes from his pen, in spite of Yarrell's more expensive work, cannot fail to be acceptable to those whose pockets are not so extensive as their desires. In truth, this little volume is charmingly and naïvely written, and the numerous illustrations are of a tolerably effective character. A good deal of new matter from *Land and Water* is worked up, as well as recent observations in the Brighton Aquarium; so that the reader will be put in possession of the newest facts relating to the natural history of fishes.

Mr. B. T. Lowne's essay on the "Philosophy of Evolution" is one of the two which carried off the Actonian prize. Although unassuming in its character, it gives the reader a fair and just summary of what the scientific doctrine of Evolution means. The advance which this doctrine has made among the best naturalists in all countries, and the undoubted light it has thrown on many "hidden secrets," make it imperative on all professing to have an intelligent knowledge of natural history to know *something* about it. We need not say that Mr. Lowne does not profess to exhaust the subject. Within the short limits of an essay many of the most important points can only be glanced at, which the student will find worked out in detail in Mr. C. Darwin's more voluminous works. Many of Mr. Lowne's views are, notwithstanding, original, and will be received as welcome contributions to Evolution. The latter doctrine is treated from a physiological, as well as from a natural-history point of view; and the plates at the end of the essay help the student very considerably to anatomical and other details of structure. The aim of the essay is to prove, further, that the doctrine of Evolution, instead of being atheistic and irreverent, as some ignorantly suppose and still more ignorantly proclaim, gives a higher and nobler conception of the Creator's works, and of the wise plan on which the scheme of animal and vegetable life has been based. We congratulate Mr. Lowne on his well-written and most readable essay.

We hardly know what to make of the next book on our list. We have been amused by many *smart* sayings it contains, and pained by others attempting to be smart, but which have not got beyond being flippant. It professes to give a popular and "funny" description of the earth's biography, from an ultra-evolutionist view; but if it had been a

burlesque on the doctrine, we think it would have achieved its end much better. Whether Evolution be true or false, it is certain that the question is of too serious a nature to be so flippantly disposed of as Dr. Wood imagines. We want to get at the truth of God's universe, not to be constantly taking partisan sides in the matter, and fighting for systems as if they were in the place of great truths. We therefore deplore such books as these, as likely to injure the cause they attempt to further. Having delivered ourselves of this opinion, we may remark that the book is well written, and displays a knowledge of the subject we should have been glad to see worked out differently. Every now and then we get an idea or a generalization which shows us that the author could have done so, had he thought fit.

"Half-hours in the Green Lanes" may seem to come late for what notice we ought to give of it. Criticism we leave to others, with due gratitude for such kindly remarks as have already been made concerning it. All we have to do is to announce its existence, and to say that the endeavour of the author has been, by its means, to make a country stroll both more enjoyable and more instructive.

MICROSCOPY.

Bacteria and Microzymes. M. Béchamp and M. Estor, in a paper published in the "Comptes Rendus," have shown that, in the stomach of a dog during digestion, microzymes are found, and various forms of *Bacteria*. Beyond the pylorus, nothing but microzymes are met with till the ileo-cæcal valve is reached. In the large intestine *Bacteria* are abundant. If, however, there be in the intestine any cause of irritation, such as a tapeworm, microzymes are immediately developed into *Bacteria*.

Life-History of a Cerco-Monad.—A most important paper, bearing the above title, recently appeared in the *Monthly Microscopical Journal* from the pen of Messrs. Dallinger and Drysdale. These gentlemen have, with the highest objectives, and the most admirable patience, watched the entire development of the creature above named. They continuously examined, during sometimes as long a period as fourteen days, a peculiar monad, hitherto undescribed, but which is from some circumstance developed in enormous quantities in the fluid resulting from the maceration of the head of a cod. This form passes through a remarkable series of changes, each of which might be taken for a distinct and independent creature, were not its evolution perfectly regular. Whilst observing this object they noticed a second form, which possessed only one flagellum instead of two. When mature, this form multiplies by fission for a period extending from two to eight days. It becomes peculiarly amœboid, two individuals coalesce, slowly increase in size, and become a tightly distended cyst. The cyst bursts, and incalculable hosts of immeasurably small sporules are poured out as if in a viscid fluid, and densely packed. These are scattered, slowly enlarge, acquire flagella, become active, attain rapidly the parent form, and once more increase by fission. Experiments were next made to determine the influence of heat. An ordinary slide, containing adult forms and sporules covered in the ordinary way, was in seven distinct cases allowed to evaporate slowly, and placed in a dry heat raised to 250° F. It was then slowly cooled, and distilled water was taken up by capillary attraction. On examination, all the adult forms were seen to be absolutely destroyed, and no spore could be definitely identified. After being kept moist in the growing stage for some hours, and watched with the $\frac{1}{50}$th, gelatinous points were seen in two out of the seven cases, which were recognized as exactly like an early stage of the developing sporule, and by careful watching, these were observed to attain the small flagellate state.

Focal Differences of the Eyes.—I have just had a fact communicated to me relative to the above subject, which might prove of interest to Science-Gossip. A gentleman (who is a student of the microscope) informed me that he always found a difficulty in studying with a binocular microscope, in that he could never get the two glasses to blend. In 1851 he went to the Great Exhibition, where the eye was constantly ranging from short to long distances. After he had left the Exhibition he felt that his eyes were very much fatigued, and was at a loss to understand the meaning of it. By this and other circumstances he discovered that there was a *focal difference* in his eyes. That one eye was *far*-sighted, while the other was *near*-sighted. He showed me a pair of spectacles he wears for reading purposes, in which the one glass is made for the *far* sight, while the other is a plain glass, the *left* eye being *near*-sighted, and consequently requiring no aid from spectacles with which to read. Since this was told me I have heard of two other instances where people were observed always to read with *one eye*. Probably they could not have told the reason. This may possibly be the case with other people, while all the time they are in utter ignorance of it. Thus in the literal sense of the words we may be *blind* without knowing it. If any should be under an apprehension that they have this defect, the way to prove it is simple enough. Hold up a piece of card before one eye, and then look at an object before you. Then gradually bring the card across to the other eye, and see if your view is as perfect; if so your eyes are perfect as regards the balance of their foci. If not, there is a focal difference, more or less decided. Doubtless this will account for some

people being unable to appreciate the binocular, as in the case of my friend.—*W. S. Palmer.*

PHOTOGRAPHING MICROSCOPIC OBJECTS.—"M.B." would like to know if a negative could be got by putting a wet plate in a special adaptation into the place of the eye-glass of the eye-piece. This seems to "M. B." the most natural method of getting a true magnified image, provided that it is only feasible. "M. B." is aware that Davies directs the entire removal of the eye-piece all through the process, so that the only amplification one would get is that through the objective. And so, when one wanted to photograph diatoms or Polycistina, the $\frac{1}{8}$th or $\frac{1}{12}$th would probably be necessary to get an image sufficiently large; whereas by the new suggestion the $\frac{1}{4}$th or $\frac{1}{5}$th would seemingly answer best, with a C eye.

BOTANY.

HASTINGS ALGÆ.—I have perused with interest Mr. Grattann's paper in SCIENCE-GOSSIP on the irregularity of appearance of some algæ, and can quite indorse his remarks in many instances. With regard, however, to *Bryopsis plumosa* at Hastings and St. Leonards, I may inform him that I have never once failed to find it growing in rather muddy pools nearly opposite the Boundary Archway, which used once to go by the local name of the Rocks of Gibraltar. There it flourished abundantly in all its forms, including one which approaches so nearly to *B. hypnoïdes* as almost to suggest that they may, after all, be but extreme varieties of one Protean and polymorphous species. That these adjectives can be applied to it, I can from personal experience testify, as in the early part of last year I found a small well-nigh irrecognizable form growing on the coral reefs at Keylvert, Gulf of Mexico, showing plainly that the tropic of Cancer was essentially its most southern limit, while at Charleston harbour, South Carolina, where it attains its maximum growth, 8 to 10 inches in length, it grew in handfuls, and seemed, in company with the rare *Crateloupia Gibbesii*, for which this is, I believe, the only known locality, to usurp the place of all else. Like Mr. Grattann, I only succeeded in finding *Polysiphonia byssoïdes* one season at Hastings, and then towards the Ecclesbourne Rocks—rocks hitherto very favourable to the growth of algæ, but already beginning to be ruined by the new drainage system, which has, under the superintendence of Mr. Bazalgette, been within the last three years transferred there. I once obtained *Sphacelaria plumosa*, a fine but small specimen, at St. Leonards, after the equinoctial gales in September, 1866: it was parasitical upon *Himanthalia lorea.* The same root produced some small specimens of *Dasya arbuscula.* I am quite at a loss to account for algæ shifting their position and becoming extinct in certain localities, where formerly they were known to grow profusely. I only know that when I visited Torquay last July, and explored the rocks at low water, I found that nearly all the localities I had known seven years ago for *Tænia atomaria, Delesseria ruscifolia, Wrangelia,* &c. &c., had materially changed. But seven years is a long time; the very rocks are continually being worn away by the repeated undermining action of the waves, and this must be, to some degree at all events, one of the causes of their spontaneous removal and extinction. I have no doubt that certain seasons possess certain atmospheric conditions either favourable or unfavourable for the growth of certain species. The same influences tell also in case of the Phanerogamia, though perhaps to not so great an extent; but at all events, if we keep to the Cryptogams, it can hardly have escaped the attention of the most unscientific how very much better one year is than another in the propagation of fungi and the like.—*J. Cosmo Melvill, F.L.S.*

ON THE FERTILIZATION OF CERTAIN PLANTS.—1. *Scrophularia aquatica*, L.—In the common *Scrophularia aquatica* the anthers may be seen—(*a*) projecting some distance above the lower lip of the flower, while the style is still undeveloped, and concealed some way down in the tube. In other cases (*b*) the stamens and styles alike have risen, but not to the same extent as in (*a*), above the level of the orifice; while in a third instance (*c*) the anthers are barely visible, but the greatly lengthened style is closely reflexed over the lower lip of the corolla, and indeed almost reaches the upper border of the sepals. Are these several changes only the result of growth, or is there anything like trimorphism in these plants? More probably, perhaps, as in the case of some of their nearest allies, they are regularly protandrous, and these appearances would thus find a ready explanation. 2. *Callitriche verna*, L.—If any one watches, in an aquarium for instance, a living specimen of the more deep-water form of *Callitriche*, the long stamens will be seen protruding to a considerable height above the rosette of floating leaves: these are far too closely set to allow of the pollen finding its way between them, so as to reach the female blossoms, which are below the water, and the concave surface of each leaf forms a cup that would effectually retain any grains that might chance to fall on it. Again, in many cases the fertilization seems to be effected altogether beneath the water; and even when, as is generally the arrangement, the male and female flowers occupy opposite axils, it is difficult to see how the pollen can be conveyed from one to the other; and yet the carpels appear almost invariably to have been successfully fertilized. A

very similar question presents itself when, as often happens, the plant forms a densely matted tuft on the surface of the mud, and at the time of flowering is quite free from the water: it seems improbable that the same method could be employed for an aërial as for a subaqueous process. In this connection it would be interesting to ascertain definitely whether the plant is really annual or perennial, a matter which at present seems open to some doubt. 3. *Neottia Nidus-Avis*, Rich.—Besides the generally unattractive appearance of the flowers, and the absence of odour, there is no spur, or other visible reservoir for honey. Where then is the inducement for the larger insects to visit this plant? And in the case of the pollen-eaters, there is nothing to take them near the stigma at all. Left to themselves, the contents of the anther fall naturally on to the upper surface of the style and projecting rostellum, which effectually shuts off the stigma below, and there the smaller insects would betake themselves, alighting on the tongue-shaped termination, without visiting any other part of the flower. Agency of this kind, then, seems quite inadequate. I have experimented with pencils, blades of grass, &c., without producing the slightest result; and yet, in gathered specimens at least, I have seen portions of pollen which had apparently detached themselves from above, and still retained their connection, adhering to the viscous surface of the stigma. How then did these pass the projecting cornice of the rostellum? I do not doubt that the subject is fully treated by Mr. Darwin, but I have not now his work to refer to. The question may not be found without interest by some of your correspondents.—*R. A. Pryor.*

Drosera rotundifolia.—Have any of the readers of Science-Gossip ever observed that this plant is proliferous? If the leaves become partly covered with soil, numbers of young plants are produced from their surfaces.—*Henry Laver, Colchester.*

Marine Algæ.—Mr. Grattann's very interesting paper on marine algæ in Science-Gossip for September induces me as a collector to offer a few remarks on what are termed the "rare algæ." There must be many parts of our sea-coast that probably have never yet been visited by an experienced algologist, and, excepting the "favoured localities," many others have only been superficially explored. For instance, Weymouth is very seldom named as a locality for sea-weeds, and yet there are few parts of our sea-coast more rich in algæ, both as regards the common and the rare species. I visited Weymouth for the first time in 1863, and although not an experienced algologist, I found among sea-weeds of the rarer class, the *Seirospora Griffithsiana*, the *Dudresnaia coccinea*, the beautiful *Naccaria*, lovely *Callithamnions*, *Sporochnus pedunculatus*, the rare *Poly. furcellata*, *P. subulifera*, *P. simulans*, the pretty little *Bangia ceramicola* (a northern plant), parasite on *Ceramium* and fringing the leaves of the *Zostera marina;* luxuriant bunches of *Bryopsis hypnoides* and *plumosa*, and above all I had the gratification of collecting, and in some plenty, the very rare *Griffithsia barbata*. I sent specimens of it to the late Dr. Harvey, who in acknowledging them said, "it had hitherto only been found on the Brighton coast by Mr. Borres." But it would occupy too much space were I to enumerate all the treasures of the deep that are found growing on the Weymouth coast or thrown up by the sea from deep water. But from my experience of the marine algæ at Weymouth, I think it probable that many parts of our sea-coast hitherto but little known, may be as favoured, if only carefully explored, and algæ that we now consider local or rare be found to be more generally distributed.—*J. R. I.*

Cotoneaster vulgaris.—I should be glad to make known to botanists that I have lately discovered on Worle Hill, near Weston-super-Mare, a shrub of *Cotoneaster vulgaris*, which I believe has been hitherto only known to grow at Llandudno. It had every appearance of being perfectly wild, and the situation and soil were much the same as those on which it is found at the Great Orme's Head. I should be glad to know if this locality is, as I suppose, a new one.—*H. Reader.*

Local Names of Common Plants (p. 235).—"E. D. B.'s" interesting list of Devonshire plant-names would be much more useful if he would kindly make it a little more explicit. Generally speaking, "E. D. B." seems to have put what he considers the common English name first and then the local name; but in one instance, the first of the list, the reverse seems to be the arrangement, and the first name "Summer Farewell" seems to be the Sidmouth name for "Ragwort," which is the ordinary English name for some of the coarser *Senecios*. Again is "Willow-herd" a local name, or is it merely, as I suppose, a misprint for "Willow-herb"? It is misleading, too, if the scientific name is not used instead of the ordinary English name, because one of the chief objects of collecting local names is to identify them, and make it certain what plant is intended. Thus is any particular species of St. John's Wort called "Tipsen"? Is "Hemp-nettle" *Galeopsis?* if so, which species? Does "Dropwort" mean *Spiræa filipendula* or *Œnanthe crocata?* because it makes a good deal of difference. Which "Bind-weed" is intended? Is "Snapdragon" the wild *Linaria vulgaris*, or the garden *Antirrhinum majus?* Perhaps "E. D. B." will supplement his list with the Latin names.

There are one or two very peculiar local names in the list, and I shall be glad if "E. D. B.," or some other correspondent, can tell me the origin of *Mush-room* as applied to Tansy; why Bulrush should be called *Daisy* ("Levers" is applied to other flag-like plants). Why should Fleabane be *Camels?* *Erigeron* is not like a chamomile. Why is the fruit of Black Briony *Row-berries?* and what can be the origin and meaning of Hasty Rogers?—*Robert Holland.*

The Northern Limit of Flowering Plants.—Captain Markham, who came home recently with the crew of the *Polaris,* brough with him a collection of plants obtained by him in Arctic regions. Some were collected by Dr. Bessel in lat. 82° N., the most northern point from which any flowering plants have as yet been obtained. They include *Draba alpina,* L.; *Cerastium alpinum,* L.; *Taraxacum densleonis,* Desf. var.; and *Poa flexuosa,* Wahl.

ZOOLOGY.

Ianthina fragilis.—On a visit to Islay this last month I collected above six dozen of *Ianthina fragilis,* Lam. They were of various sizes, some with the animal in—putrid, others clean: they were most of them perfect. From what I can learn they have been gathered nearly fresh there. I do not think that this locality is recorded in the books.—*R. Y. Green.*

Hyalæa trispinosa.—I have to record the occurrence once again in British waters of *Hyalæa trispinosa.* I was fortunate enough to discover two specimens of this shell a few days ago adhering to a log of timber which some fishermen had found adrift off the island of Herm. The shells were quite perfect, and though the animals were dead, and only a small portion of them remained, I have no doubt they were alive when the log was found by the fishermen, and that they were killed by its having been drawn up high and dry at Guernsey, two or three days before I examined it. I do not know whether *Hyalæa trispinosa* has been noticed on any of our coasts since it was taken, "on floating timber near Dublin;" at all events, its claim to rank among our true British species is as yet very slight. Still, that it is an occasional, though a rare and probably an unwilling, visitant to our shores, is authenticated by the two specimens now in my possession.—*Murex, Guernsey.*

King-Crab off the Dutch Coast.—In last month's *Zoologist,* Mr. Thomas Southwell, F.Z.S., records the occurrence of the King-crab (*Limulus polyphemus*) off the Schelling light, on the Dutch coast. The specimen was taken by some Yarmouth fishermen in about ten fathoms water.

Stinging Fish.—The fish which Mr. Lovett inquires about (in Science-Gossip, p. 239) is probably the Lesser Weever (*Trachinus vipera*). If he will procure the August number of Science-Gossip for 1871, he will find a drawing of this unpleasant little gentleman, together with an account of other fishes of the same tribe, and some information respecting their poisoning apparatus, and references to books containing fuller details.—*Lieut.-Colonel Holland.*

The Natural History of Eastbourne.—The Natural History Society of Eastbourne have just published a pamphlet giving a list of the mammalia, birds, reptiles, amphibia, fishes, marine, fresh-water, and land mollusca, polyzoa, insects, lepidoptera, crustacea, and all the species of the lower animal kingdom found in their neighbourhood. To this has been added a catalogue of the local flowering plants, ferns, mosses, lichens, algæ, diatoms, &c. The introduction is very modest, but it will be seen that the work done is enough to distinguish the Eastbourne Natural History Society as one of the best of our numerous provincial associations.

GEOLOGY.

Loess of Northern China.—One of the most interesting addresses in the geological section of the British Association was by Baron Von Richtofen, on the above subject. The Baron has devoted three years to examining the Loess which covers the whole area of Northern China, being found from the sea-level to 12,000 feet above it. The deposit averages from 1,000 to 2,000 feet in thickness, and the Baron is convinced it is due entirely to sub-aërial action, that part of the world having been dry land since the Triassic epoch. No remains are found in it, except of land shells and land animals, and the area is intersected with deep ravines cut through by the rains.

Popular Names of Fossils.—A few days ago, whilst working the carboniferous limestone in the neighbourhood of Clitheroe, Lancashire, I obtained the following names in vogue there for some of the fossils:—"Tup's horns" (*Natica*); "Cat's feet" (*Terebratula acuminata*). *Trilobite* was a well-known term among the older quarrymen, but pronounced "Thrilobite." "Human head" was the name given to a species of *Platycrinus,* whose plates give to it a not unnatural resemblance to a cranium.—*J. E. Taylor.*

The Oldest Fossil Butterfly.—There has recently been brought to light a wonderfully perfect impression of the front wing of a butterfly from the slaty limestone of Oxfordshire (Lower Oolitic formation); the oldest species previously discovered having been found in the white sandstone of Aix, in Provence (Upper Cretaceous). It

follows that this is by far the most ancient of all determined fossil butterflies. Mr. Arthur Butler, of the Zoological department, British Museum, determined the position of this species to be in the sub-family *Brassolinæ*, a group of exclusively tropical American butterflies of the large family *Nymphalidæ*. He exhibited it at a recent meeting of the Entomological Society, and has since published a description of it in the January part of his "Lepidoptera Exotica" (a 4to. work devoted to the illustration of exotic butterflies and moths). He has named it *Palæontina oolitica*. The family *Nymphalidæ*, to which this species belongs, is placed by Mr. Bates at the head of the butterflies, as being most remote in structure from the moths. If we begin with this family, an uninterrupted gradation of character and habit can be traced from them to the moths; it is, therefore, a highly interesting fact, as evidencing the very great antiquity of butterflies, that *P. oolitica*, the oldest determined fossil species, still belongs to the most highly developed, and, consequently, the most recent, of all the five families into which this sub-order is divided. Seven fossil butterflies have now been made known to science, but as two of these (*Vanessa pluta* and *attavina* of Heer) are possibly impressions of opposite surfaces of one species, the number may be, perhaps, reduced to six. *P. oolitica* is the largest of all, and, when flying, must have measured 5¼ inches in expanse of wings. It was probably a male insect, as indicated by the form of the front wing. The veins of the wing are of a rusty colour, as if impregnated with iron, which would account for their very perfect state of preservation; unfortunately the colours and markings have all disappeared because of its great antiquity. Since the publication of Mr. Butler's description, Mr. Charlesworth has discovered the twin impression of *P. oolitica* in the collection of the Jermyn-street Museum.

The Sub-Wealden Boring.—At length this important boring has passed through the Wealden and Purbeck beds, and is now in strata evidently belonging to the Kimmeridge Clay. The experiment is rapidly increasing in scientific interest.

Extremes Meeting.—It is worthy of note that, according to a recent traveller, extremes of animal life meet together on the river Amoor, at the present day; thus "the reindeer and Bengal tiger, the wild-boar, the badger, the polar hare, and glutton, all range the same latitude." Let us apply this example to the Rhine; remove the impediments to free animal transit offered by civilized man, and we shall see that fossil remains of differing types may well co-exist in the same strata, or be found in the same cave, without a necessity for assuming any change of climate, or any material difference of era.—*A. H.*

NOTES AND QUERIES.

Traps for Small Animals.—Being desirous of examining freshly-caught specimens of the smaller British mammals (mice, moles, shrews, &c.), I should feel grateful if any reader of Science-Gossip would inform me of some simple snare or trap for capturing the same.—*W. H. Warner, Kingston.*

Green Field-Cricket (*Gryllus viridissimus*).—This large and beautiful insect, which occurs very commonly in August and September, on the hedges in this neighbourhood, appears to be of a very voracious disposition. On September 10th I took one from a cabbage-leaf in the garden, and to my surprise found it had a full-grown but partly eaten caterpillar of the large Cabbage Butterfly in its mouth, and was busily engaged in sucking its juices. It required some little force on my part to disengage the caterpillar.—*W. H. Warner, Kingston.*

Owls.—Returning from shooting the other evening, I was astonished by hearing a loud and hissing noise proceeding from a hollow elm-tree, and on approaching it saw five white owls sitting on the branches, from which they would fly into the interior of the tree, that being, no doubt, their dwelling-place, as I have often seen them there.—*E. M., Woodbridge.*

Foraminifera in Chalk.—Can any correspondent inform me what means are generally employed to obtain Foraminifera from chalk, and how they should be mounted?—*B. M.*

Signs used to denote Sex.—I have often been puzzled to account for the origin of the signs in use among naturalists to denote the male (♂) and the female (♀) sexes; but the other day, while reading an astronomical paper, I came across a fact which seems to offer a solution of the difficulty. It appears that the first sign (♂) has been used from remote antiquity to signify the planet Mars, and is a rude representation of a spear behind a shield, fit emblems of the God of War. Ceres, the goddess of corn, was similarly symbolized by the sign used in zoology to denote the female sex, with this slight difference, that in the original astronomical sign, the continuity of the circle is broken on the left side, so that the figure appropriately represents a sickle. I thought this might perhaps interest some other readers, who, like myself, have been curious as to the history of these odd-looking signs.—*E. C. Lefroy.*

The Praying Mantis. — A correspondent, "E. C.," asks for a description of this insect. It is a large, curious-looking thing, presenting very much the appearance of a collection of brown twigs and faded green leaves. The slender limbs are flattened out in some places, and so shaped and tinted as to look exactly like smaller leaflets surrounding the larger leaves of the body. The praying mantis has one very peculiar habit, to which it owes its name. It is fond of planting itself on a convenient branch of some tree, and then lifting up its body and arms in the attitude of prayer, in which it is able to remain perfectly still for a long time. Its object, however, is rather to prey than to pray; for it hopes to persuade other credulous insects into the belief that it is only a spray of foliage which they see; thus inducing them to come within reach. Alas for the unfortunate fly who approaches too near the hypocrite! The

supplicatory position is quickly abandoned, and the hands, lately raised to heaven, descend with unerring aim on the wretched victim. Only those who have seen this leaf insect can appreciate its extraordinary form,—a form which constitutes, perhaps, the most remarkable instance of natural mimicry in existence. —*E. C. Lefroy.*

HOW TO SEND OBJECTS BY POST.—I find "H.U.J.'s" plan has been recommended by the Quekett Club in their rules for the exchange of slides, and printed in each of their annual reports for the last seven years. SCIENCE-GOSSIP, vol. iii., June, 1867, p. 142, also contains the rules *verbatim*, with a drawing of the box.—*A. S.*

MIGRATION OF SWALLOWS.—A resident at Worthing was walking along the road to Lancing with her husband and two young nephews one afternoon in May, 1872, between six and seven o'clock, when she perceived a vast flight of swallows come from over the sea. There were thousands of these birds, and so intent were they on their progress inland, that they took no notice of these persons, but flew around them and well-nigh interrupted them in their walk. I closely questioned my informant, and she stated repeatedly that they "came from the sea." Did any one on the coast of France observe the departure of these birds for the North on this occasion?—*E.M.P.*

FERN-SHADE AND AQUARIUM, p. 214.—"W. K. G." will probably find both his trouble and cement wasted: neither the frame nor the glass of a fern-shade is likely to be strong enough to bear the weight of the body of water required, unless the quantity be very small.—*R. P.*

EYE OF BEETLE.—Can you or one of your readers kindly inform me the method in which to set up a microscope so as to show a photograph in the eye of a beetle, as is sometimes shown at the microscopical soirées, &c.? I have tried but have not been able to succeed in getting a *good* multiplied image.—*M. W.*

MICRO-LEPIDOPTERA.—Can you or any of your talented correspondents give me any information as to killing, pinning, and *setting Micro-Lepidoptera*, or whether there is any work wherein the information I require is contained, as I find that Stainton's "Entomologist's Companion," the most likely one I know of, has been out of print some years?—*James Edwards.*

POISON OF SPIDER.—While looking at the fang of a spider (*Tegenaria domestica*) just killed, which fang I had forced back, I saw a white matter issue from the aperture at the end. Will any of your readers kindly inform me if this would be the poison itself?—*F. F.*

QUEEN BEES AND DRONES.—I do not think that the queen bee is ever impregnated in the hive, but takes her flight when the drones are taking theirs. I judge this also from the fact that the German bee-masters, in order to keep a breed pure, such as the Ligurian, contrive to keep the queen in a little cage, and when the drones of other kinds have settled, she is set at liberty with the drones of her own kind, when they take their flight. This they kept a secret, charging 10s. for it, and requiring each person to whom it was made known not to reveal it, so that for some time they made a good deal by it. With regard to the death of the drones, it is known that they are driven from the hive and killed by the bees at a certain period of the year, commencing generally at the end of July, when I have frequently found them in the way described, *i.e.* with their wings spread out. Whether the drone dies after impregnation I cannot say; if so, it is like the silkworm moth, which dies immediately after, and the female as soon as she has done laying her eggs.—*T. O. Wood.*

MOLES.—Can any of your readers suggest a means of destroying moles otherwise than by traps, or what trap is the most successful and least disfiguring to the grounds?—*R. Brn. von Hube.*

NAMES OF BIRDS.—"Molly-mawk" is the common name of the Albatross. "Mallemoke" is the term applied by Bewick to the "Fulmar Petrel." The latter is evidently a corruption of the former. Both the "Fulmar" and the "Albatross" are constant attendants upon whales, and therefore I have no doubt but that in different parts of the world they may both be called "whale-birds."—*C. R. Bree, M. D.*

BATS IN DAYTIME.—A few days ago, as I was walking near Shide, in the Isle of Wight, about half-past one o'clock in the afternoon, I saw a bat flying about and chasing its insect prey just as unconcernedly as it would have done at its usual hour. I watched it for about ten minutes; the light did not seem to affect it in the slightest degree. Will any correspondents tell me the reason why an animal so strictly nocturnal in its habits should venture forth in the middle of the day beneath a glaring sun?—*Frank Morey.*

RARE BUTTERFLIES.—If your correspondent, Maberly, procures Coleman's book on British butterflies, published at 1s., he will there find the information he desires about the varieties; but I may mention there are over forty different species taken in this neighbourhood; among which are *P. daplidice* (Bath White), *V. Antiopa* (Camberwell Beauty), *A. Lathonia* (Queen of Spain), all the blues with one exception, and *P. comma* (Silver-spotted Skipper).—*J. H. Allchin, Dover.*

THE AQUARIUM IN WINTER.—Can any of your readers suggest a plan by which I may keep my aquarium out of doors during the coming winter? It is in an inclosed yard, and is supplied constantly with fresh water by a small tube communicating with a tank inside a wash-house. I kept it out of doors all last winter, but there were no animals in it, with the exception of a few snails. It was frozen repeatedly without injury to the glass, and the snails took no harm. I have it in working order again (for the frost broke all the cement away and completely spoiled it for the season), and the fish, which have been its inhabitants for some months, are quite healthy. I had a male and female newt in it for a week or two; but by some means one morning one had disappeared, and, shortly after, the other was missing too. As I had a close wire cover over it during the night, it is difficult to account for their disappearance. I have sometimes thought they were eaten by a perch that was in at the same time and is still a healthy inhabitant. Have any of your readers ever known a perch gobble a newt? If your readers will kindly inform me what kinds may be advantageously kept together, I shall be glad. I allude to fresh-water fish.—*W. Swatman.*

HEDGEHOGS.—About a fortnight since, I had a hedgehog and four young ones brought to me. I kept them in a box. The mother has since died, I rather fear from exhaustion, as she suckled her young, and I did not know what to give her except bread and milk. The young ones are thriving; they are about the size of a large orange, and run about on the grass-plot, and will soon I think be tame; they feed greedily on worms and snails; and last night made short work of a body of a mole (which my dog had just caught and killed); not a vestige appears to-day in their box. I should like to know anything more about their food and habits: they do not touch apples or berries. Their cry to the mother was shrill, and very like the note of a child's whistle, but I never hear any sound now. They are said to be capital destroyers of cockroaches, &c.—*L.*

STINGING FISH.—I imagine the fish mentioned by the *Echo* correspondent to be the Otter Pike (*Trachinus vipera*), figured and described in this journal (volume for 1871, p. 171). It may also be the Sting Ray (*Raia pastinaca*), the long flattened spine of which is capable of inflicting very severe wounds. This spine is cast annually, the new spine often attaining a large size before the old one has dropped off, in which state it has been described as a distinct species.—*C. L.*

CRANE FLY.—Has it ever been ascertained if the legs of this insect are reproduced? Its life is probably not long, but the creature manifests such an utter disregard for the safety of these appendages, that, towards the close of its career it must be in a state of utter destitution, if there be no such provision.—*C. L.*

THE VANESSIDÆ.—Has there been a general scarcity of *V. Atalanta* this year? I have not seen a single specimen. I looked for the larvæ in June and July, as I wanted a few, but did not succeed in finding any. *V. urticæ* and *V. Io* have been common, the former I think even more abundant than usual. —*E. D. M.*

SHORE LARK.—Mr. Mathew (SCIENCE-GOSSIP, p. 234) is certainly misinformed as to the number of shore larks recorded as having been killed in England. The first British specimen recorded was killed on the Norfolk coast at Sherringham, in March, 1830; since that time it has occurred in this country in 1850, 1855, 1861–2, and again in considerable numbers in the winter of 1869–70. I have in my own possession five killed at the latter date. It has also occurred, in addition to the years named above, on the Suffolk coast in 1862–64 and '65, and on the south coast of England. Mr. Stevenson (*Zoologist*, *N.S.*, p. 2367) says *thirty-eight* are known to him to have been killed in Norfolk since 1830, and many others in Suffolk; and it must be remembered that these are only representative members of the flocks from which they were killed. It is probable that it has frequently passed along the coast unrecognized. —*T. S.*

BLUE-BOTTLE FLY (p. 211).—"S. A. B." may, during this month and the next, if the weather is fine, see numerous blue-bottles sipping the honey from the ivy, in company with other flies, wasps, &c. —*W. W. S.*

NOTES ON APHIDES (p. 173).—I am obliged to Mr. Westropp for his courteous reply to my questions in last month's SCIENCE GOSSIP: like him, a friend of mine says he believes he has seen an aphis suckle its young, and I think Morren has made a similar statement. Perhaps, under these circumstances, I am hardly justified in thinking they may possibly have been mistaken. I have watched Aphides a little, but was never so fortunate as to see an insect thus refresh itself. I do not feel qualified to make a positive assertion on the subject, but would ask if the structure of the mouth is suited to taking nourishment in the manner described. I know the young will occasionally climb on to the parent's back; sometimes they do so immediately after birth, but usually (so far as my experience goes) the offspring at once take up their station behind their mother, and commence feeding on the leaf, and I am rather at a loss to know why any exception to this rule should occur. My library is on a very limited scale, but, so far as I am aware, Morren is the only observer who has made any statement respecting this, and surely if any other of the celebrated men who have watched the Aphis had seen such a thing, they would not have failed to record a circumstance so unusual in insect life. As regards laying eggs, I most decidedly think Mr. Westropp's friend is in error. Although it is often stated in "popular" works on natural history that the winged insects lay eggs, still, so far as I have observed, the winged females are all viviparous, and eggs are only laid by apterous insects. I believe Professor Huxley also takes this view, and protests most strenuously against the error which has been propagated through one author copying the writing of another. I ought perhaps to say I have only bred and watched the Rose Aphis; my acquaintance with other species is quite casual.—*E. P. P.*

BOOKS RECEIVED.

"Half-Hours with the Microscope," a new edition, with chapter on the Polariscope. By F. Kitton. London: Hardwicke.

"Spirit and Mind Polarity." By Arthur Young. London: Houlston & Sons.

"Grevillea." October.

"Monthly Microscopical Journal." October.

"Canadian Entomologist." No. 7.

"Boston Journal of Chemistry." September.

"Popular Science Review." October.

"Eastbourne Nat. Hist. Soc. Lists of the Local Fauna and Flora."

"American Naturalist." September.

"Les Mondes."

"American Agriculturist."

"The Darwinian Theory of the Law of the Migration of Organisms." Translated by J. L. Laird. London: Edward Stanford.

"Tenth Annual Report of the Belfast Field Naturalists' Club."

COMMUNICATIONS RECEIVED UP TO THE 10TH ULT.—H. A.—J. W.—E. M. P.—H. H.—A. D.—W. S. P.—H. M. W. —R. P.—W. S.—E. W.—J. P. G.—J. R. I.—B. T.—M. G. W. —J. E.—R. T. S.—C. F. W.—G. H.—E. C.—G. R. W.—F. F. —C. B.—S. A. B.—J. C. M.—J. V. E.—C. R. B.—W. K. M.—J. L.—T. O. W.—R. J. L.—J. C. M.—A. S.—F. R. S.—E. C. L. —J. H. A.—W. S.—H. B. T.—T. T.—J. D.—C. B.—F. M.—F. W. H.—H. L.—G. S. T.—A. E. S.—R. B. H.—W. H. R.—T. L.—H. E. S. R.—J. H.—C. O. G. N.—J. R. S. C.—E. D. M. —R. H.—H. A. A.—E. P. P.—C. L.—S. T. P.—W. L. W. E. —J. P.—W. H. W.—H. J. McG.—A. H.—W. W. S.—C. J.—W. H. W.—B. M.—E. S.—H. E. W.—E. W.—G. O. H.—G. D. B.—H. W. I.—J. D. S.—H. W. S.—E. F. F.—C. C. U.—W. H. B.—S. M.—C. J.—E. L.—W. B.—E. H. S.—S. S.—J. H.—M. M.—J. T.—G. R.—J. J. R. B.—E. H.—J. H. L.—R. A. P.—W. L. S.—J. A. jun.—F. A.—J. H.—G. D.—T. C. C. —E. C. J.—C. V. G.—S.—H. C.—W. B. G.—C. C.—J. A.—E. C. R.—J. S. H.—G. G.—J. F.—R. M. B.—A. S.—H. B. T.—C. H. P.

NOTICES TO CORRESPONDENTS.

H. Allingham.—Your specimen is the Centuary (*Erythrea centaurea*). The book you mention is a good one. but not equal to Dr. Hooker's student's "Flora of the British Islands," at the same price.

W. Howchin.—The back of the leaf sent is covered with "Oak-spangles," a gall produced by a species of *Cynips*.

C. Bucknall.—You cannot do better than procure Dr. Hooker's "British Flora." Cooke's "Hand-book of British Fungi," published in two vols. (Macmillan, London), is the best and cheapest book on that subject yet published. Price, a guinea.

Thomas Williams.—Your letter came to us marked "Received open at General Post-Office." It contained nothing but the note, and the envelope was unstamped.

Maberley will hear of rare butterflies by applying to Mr. John Purdue, Ridgeway, Plympton, Devon.

Frank Allen.—Walker's "Insecta," and Stephens' works are the only books we know of that treat the subject fully. Wood, in his "Insects at Home," treats on the more common dipterous insects.

John Dawson.—Many thanks for the specimens of *Isoetes hystrix*, which reached us in safety.

E. Clarke.—The leaf of the *Potamogeton* had on it the young of the *Lymnea*.

G. R. Wynne.—It is not unusual for the leaves of the Horseradish to assume a pinnate form under the circumstances you name. It may be due to the rapid growth of the leaf. (See Masters' "Vegetable Teratology.")

W. W.—It is *Puccinia malvacearum*, not found in Britain till during the present year.—M. C. C.

H. W. I.—Mr. Hobkirk's "Synopsis of British Mosses" may be had of Hardwicke, 192, Piccadilly. Accept our thanks for seeds of *Angelonia*.

Erratum.—In Mr. J. O. Harper's "Exchange" of last month, the word "larva" appeared instead of "hair." Those interested will please note the correction.

H. Marshall Ward.—The minute yellow dots on hop leaves are apparently *lupuline*, from the strobiles of the hop.

J. Hodgson.—1. Not quartz but calc-spar, as may be told by the rhombic cleavage of the mass; 2. Iron pyrites, with radiated structure; 3. Yellow cubes of fluor spar (*Calcic fluate*).

M. U. T.—You will find teratological subjects treated in the new edition of Cooke's "Manual of Botanic Terms." (London: Hardwicke.)

E. C. J.—On *Solidago* is *Puccinia virgaureæ*; on *Anagallis* not a fungus,—only diseased tissue.

R. V. Tellan.—The lichens are—1. *Verrucaria cinerea*;—2. destroyed in transit, but looks like *Pannaria nebulosa*.

E. W.—The Caterpillar is that of the Golden Sallow-moth (*Xanthia fulvago*).

H. J. McGill.—All the *Caryophyllaceæ*, of which the Lychnis is a member, are liable to the modification you mention.

S. T. P.—The objects on Oak-leaf are not fungi, but "Button-galls," formed by an insect a species of *Cynips*. See "Half-hours in the Green Lanes." (London: Hardwicke.)

Rev. S. A. Brennan.—The drawing represents the caterpillar of the Pepper Moth (*Amphydasis bætularia*), a common species. This twig-like form of caterpillar is common to a very large number of species of moths of the family *Geometridæ*. They do not make the trees upon which they feed unhealthy.—*C. G. B.*

T. M. Hoare.—These eggs appear to be those of the common Drinker Moth (*Odonestis potatoria*), but infertile and shrivelled.—*C. G. B.*

E. H. S.—There is a most exhaustive paper called "Contributions to the Flora of Berkshire," by Mr. James Britten, F.L.S., of the British Museum, published by the local society.

John Turner.—Mr. Grattann is now publishing such a work as you mention in monthly parts.—Address, "Bazaar" Office, Wellington-street, London.

C. V. Green.—Your specimen is the Nodding Bur-Marigold (*Bidens cernua*), a member of the *Compositæ*.

W. B. G.—The objects on the fern are the Scale-insects, a species of *Coccus*, of which the body of the female becomes a sort of cocoon under which the eggs are hatched.

C. C.—It is difficult to decide from so small a specimen, but it looks like the Lower Chalk more than anything else.

E. L.—We should feel obliged by your sending us a specimen.

EXCHANGES.

Mountain Limestone Fish remains, for old Red Fish.—J. Harker, Richmond, Yorks.

Eighteen first-rate Mounted Slides of Diatomaceæ (all different species), for each of the volumes of the "Monthly Microscopical Journal."—Address, B. Taylor, 56, Lowther-street, Whitehaven.

Atacamite or Remolinite an Oxy-chloride of Copper, for crystallized specimens of Libethenite, Olivenite, Apatite, Euchlorite, Erinite, Cornwallite, Klinoclase, Tamarite, Liroconite, Fryolite, Konichalcite, Ethlite, Sunite, Thrombolite, Unanite, Antimite, Chilchrenite, or Wavelite.—H. Hutchinson, 68, Sanderson-street, Queen's-road, Manchester.

Larva of *C. absinthii* and *geometra*, for good Microscopic Slides.—R. T. Smith, Weymouth.

For Tingis, or Lace-wing insect, send, with Microscopic Object of interest (preferably mounted).—To Dr. Swan M. Burnett, Knoxville, Tenn., U.S.

For specimens of *Larbrella Ptarmicæ* (Berkeley) on *Achillea Ptarmica*, send an addressed stamped envelope to Mrs. C. F. White, 42, Windsor-road, Ealing.

Send stamped addressed envelope for Cotton Seeds showing Oil-glands, to Mr. Charles Butterworth, No. 4, Sandy-lane, Shaw, near Oldham.

Balia perversa, Zonites glaber, for varieties of British Land and Fresh-water Shells or Marine Shells.—F. R. Stephenson, 9, Dickens-street, High-road, Wele, Halifax.

A good gathering of *Pleurosigma angulatum* (unprepared), for well-mounted Slides, or other diatom gatherings equally good.—Wm. Swinburn, 36, West Strand, Whitehaven.

Diatomaceous deposits from Peruvian Guano, for British Ferns.—Send list to R. R., 26, Commercial-street, Leeds.

Good well-mounted Slides, various, offered for good unmounted objects, &c.—H. B. Thomas, Boston, Lincolnshire.

Eggs of the Vapourer Moth for other Eggs.—A. E. Shaw, 43, Commercial-street, Leeds.

Fossil Diatoms, 15 Localities, mounted, for other Slides or Objects.—Thomas Lisle, Moorfields, Wolverhampton.

Minerals and Geological specimens, for Diatoms, Foraminifera, and Polycystina (mounted).—W. H. R., 6, Woodstock-road, Poplar, E.

Fine Specimens of *H. virgata, H. caperata, H. cantiana, H. hispida, H. arbustorum, H. rupestris. H. pygmæa, B. obscurus, B. perversa*, &c., for other Molluscs.—W. H. Mann, 17, Wellington-terrace, Clifton, Bristol.

Cuba, Jamaica, Burmah Shells, fine Minerals, Dalmatian Dried Plants, Seeds from Madagascar, for Microscopic Slides.—N., 20, Maryland-road, Harrow-road, London, W.

Portions of *Polypodium muscosum, Durio Tibethinus, Elæagnus pungens, Niphobolus Lingua*, and *Tomaderris apetala*, offered for other good specimens of mounted or unmounted objects.—F. W. Hembry, 1, St. John's-villas, Overton-road, Brixton, S.W.

For Parasite of Badger, send stamped envelope to J. Wilson, 75, Craven-street, Salford, Manchester.

Rhinoceros Horn, Hair of White Mole and others (mounted), for other well-mounted objects.—C. C. Underwood, 25, Gloucester-place, Portman-square, London.

Micro-fungi, *Puccinia coronata, striola, galiorum, variabilis, malvacearum, asparagi; Æcidium ranunculacearum, Microsphæria Berberidis, Phragmidium bulbosum, Larbrella Ptarmicæ*, for other fungi.—Send list to Geo. D. Brown, Henley-villa, Ealing.

Foraminifera from river Dee, mounted or unmounted, for same from other localities, British or Foreign.—J. D. Siddall, The Cross, Chester.

Equisetum hyemale.—Wanted a few fresh stems for a consideration.—W. White, Litcham, Norfolk.

Tapes pullastra, T. virginea, Psammobia vespertina, Artemis exoleta, Pectunculus glycimeris, Pandora rostrata, Emarginula reticulata, Scissurella reticulata, Calyptræa sinensis, &c., for other British or Foreign Shells.—W. N. Booth, 13, Kidbrooke-park-road, Blackheath, S.E.

Eggs of Bernicle Goose, Sandwich Tern, Common Tern, Common Gull, Dunlin, Green Woodpecker, Common Snipe, Sparrow Hawk, Kestrel Hawk, Crow, and Ring-ousel for other good Eggs.—Fred. Anderson, Alresford, Hants.

Well-set specimens of *Aprilina, Exoleta, Rufina, Macilenta, Monacha*, &c., for Lepidoptera or Microscopic Slides.—Joseph Anderson, Jun., Alresford, Hants.

Wanted a plant (rooted) of *Adiantum Farleyense* for three good varieties of greenhouse ferns. I grow 200 varieties. Please to name several required.—M. M., Post-Office, Faversham, Kent.

THE OLDEST TREES IN BRITAIN.

SEVERAL inquiries have been made in SCIENCE-GOSSIP (pp. 91, 142, and 144) as to the oldest tree or trees in Britain, and it would be interesting to collect statistics as to very old trees *now in existence*, their dimensions, situations, and any traditions known respecting them. But it would be well first to ascertain what has been already noted on the subject, and whether the trees already recorded as of great size and age are *still standing*. Strutt's "Silva Britannica" may be consulted as to remarkable trees actually seen and sketched by him, and Evelyn's old work on "Forest Trees," as well as Gilpin's "Forest Scenery," as edited by Sir T. Dick Lauder, contains many references to old patrician trees. I fear that some of the trees mentioned by these authors are no longer in existence, and therefore it would be advantageous to collect evidence on the subject, and give particulars as to the old forest veterans now remaining alive.

Your correspondent "J. R. S. C." says that the "size or appearance" of a tree gives "no conclusive evidence" as to its age. Not, perhaps, exactly; but its size and venerable aspect, in comparison with trees whose age is known, must unquestionably give it a claim to hoary antiquity. If we see a massive trunk like that of the Moccas Oak, in Herefordshire, a well-known aged tree, whose portraiture has been engraved, looking like a battered castellated tower, and hollow within, we may feel assured that it has attained extreme old age. And why should it be suggested that there are no British trees existent whose age exceeds a thousand years? Those who have written on and paid special attention to the subject, have judged otherwise, as I would undertake to show, though I might hesitate to agree with Pliny that in his time there were oaks in the Hercynian Forest—"*roborum vastitas intacta ævis*"—coeval with the beginning of the world itself. Still, I should confidently say that there are now in our island yews and oaks that may fairly be computed as exceeding 1,500 years in age, if not approaching to 2,000, or even beyond that. The Fortingal Yew, in Scotland, now only a ruined shell, was considered by Mr. Strutt, who has figured the tree, from all the evidence he could collect, to be about 2,500 years old. Pennant gives its girth as 56 feet 6 inches, and if still alive, this Fortingal Yew is probably the oldest tree in Britain; though the "superannuated yew-tree growing now in Braburne churchyard, Kent" (thus mentioned in Evelyn's "Silva," edited by Dr. Hunter, p. 498), and which is said to have measured 58 feet 11 inches in girth, if not destroyed, may also exceed 2,000 years in age. "Such another monster," Evelyn says, "is also to be seen in Sutton churchyard, near Winchester." It would be well to obtain present information as to these monster yews; but one grand old yew, at Crowhurst, in Surrey, I have myself seen and measured, and its girth at a yard from the ground exceeded 30 feet. A hollow yew-tree in the churchyard of Broughton Hackett, Worcestershire, not more than 24 feet in girth, was judged by Dr. Lindley to be a thousand years old. I this summer measured a grand old hollow yew-tree in Marcle churchyard, Herefordshire, which measured 28 feet 7 inches in girth at four feet from the ground, and is vigorous and massive enough to last for many centuries to come. An ancient spreading yew at Llancant, Monmouthshire, is 33 feet in girth, and numerous yews in Wales may be found of similar dimensions. Yews, from their slow growth and mode of conservation, no doubt are most enduring trees, and will maintain existence longer than the oak.

As to oaks, the celebrated Cowthorpe Oak, near

Wetherby, Yorkshire, has been considered by most writers on trees as the oldest oak in Britain, and an engraving of it was given in the "Gentleman's Magazine" more than half a century ago. Dr. Hunter states its dimensions in 1776 as 48 feet in girth at three feet from the ground, and 78 feet round the bole close to the ground. It would be well if some Yorkshire correspondent would mention the present appearance of this oak. The largest, if not the oldest, oak-tree, that I know, is "the Newland Oak," now standing at Newland, on the borders of the Forest of Dean, Gloucestershire. This hollow oak measures 60 feet in girth not far from the base of the bole. A battered and decaying hollow oak, if it has existed to observation a long time in that state, must exceed a thousand years in age, according to the old rhyme,—

"Three centuries it grows, three centuries stays,
And slowly three long centuries decays."

But in fact, having got into the stage of old age and only maintaining life, it may yet keep on an existence of another five hundred years. Dr. Hunter, in his edition of Evelyn's "Silva," gives a portrait of the Greendale Oak, at Welbeck, which has an archway cut through it for a road, and horsemen and carriages, it is said, have often gone under the archway thus made. Its greatest girth above the artificial opening is given as 38 feet. It would be well to know if this tree still remains, as it must have attained a great age.

People in general do not live long enough to mark the increase of size in trees after they have attained full maturity, and except with a few historical trees, connected with great events or old usages, the data as to the exact age of old trees is wanting. Still trees appearing to possess hoar antiquity may be noted and their dimensions taken carefully, as well as what is known of them by the oldest persons living in their vicinity; for surely trees of great dimensions, and only seen in a hollow state by the present generation, must be of considerable, if unknown, age. But let any one watch an old tree for a lifetime, and then some idea may be formed of its powers of endurance. For my own part I must say that in fifty years of observation I can mark no obvious change as to its age in a very old yew or oak. A clean cut, if it were possible to obtain one, and count the annual rings of growth, would mark the age of an exogenous tree; but where a tree is hollow, this is unavailable, and besides, a tree of moderate age cannot properly afford a test as to a very old tree, the increase in the latter case being so much slower with advancing age. The yew, too, from its being able to surround the old decaying trunk with new layers of descending alburnum, is almost indestructible, and may exist up to three thousand years, as has been suggested of some Kentish yews, or indeed for an indefinite time. The holly, too, is a long-enduring tree, and I have seen some on forest ground upon the side of the Steiperstones mountain in Shropshire, which in my opinion, and that of other observers, indicate a longevity of at least two thousand years. This remarkable holly grove attracted the notice of the late Sir Roderick Murchison, who, in his "Silurian System," mentions these "old indigenous tenants of the soil, defying all cold blasts," as being "appropriate emblems of the extreme antiquity of the rocks of this mountain." In other places there are hollies of great age, and whatever information can be gathered as to existing old treees in Britain, and their dimensions, would be very desirable.

Worcester. EDWIN LEES, F.L.S.

THE MUSK BEETLE.

OF all the numerous tribe of insects that pass their larval lives in tunnelling through our timber trees, and ultimately bringing them to destruction, there is no more active member than the Musk Beetle (*Cerambyx moschatus*). And yet, while we deplore the damage which it does, we cannot keep our affections from the larva, when it has made its final transformation into the imago state. Its sheeny wings, its graceful antennæ, its marvellous legs, all charm us with their exceeding beauty; in fact it is not too much to say, that throughout the ranks of our British Coleoptera we shall find no insect, which can compare with the Musk Beetle. Its loveliness is of the true description, and only increases on closer inspection. Viewed under a microscope, its elytra are so wonderfully beautiful, that no effort of human art could hope to give even a dull idea of the prismatic colouring. The general tint is a rich green, but there are flecks of azure, bronze, and gold studded on the surface, which considerably modify the ground colour. Some specimens indeed are almost purely green, but others approach as nearly to golden bronze, and between the two extremes there exists every variety of shade. The size also of the insects differs considerably, the smallest specimens being about half an inch in length. The general aspect of the insect will be understood from the accompanying illustration, but it is unfortunately impossible to convey any conception of the odour which emanates from its body, and from which it takes its name. This odour, which is very enduring, is often stronger after the death of the beetle than during its life, and may be perceived at a considerable distance from a tree which happens to have one or two "musks" upon its bark. Its favourite resorts are willow-trees, and my own observations lead me to think that it prefers a tree already tenanted by the caterpillar of the Goat-moth; but when once its larvæ have commenced their

burrows, they wonderfully assist their lepidopterous colleague in the work of destruction. Their tunnels are sufficiently large to admit an ordinary drawing-pencil, and are carried through the trunk in the most fantastic fashion, up and down, backwards and forwards, round and round, till at last they lead to

Fig. 170. Musk Beetle (*Cerambyx moschatus*).

the surface, where the dull-looking larva turns into the glorious beetle. I have but seldom seen them on the wing. They prefer to crawl about the tree within which they have lived so long, warming themselves in the sunshine, and waving their graceful horns. Not far from here, on the banks of the Thames, there stands a row of willows, or rather a row of trunks which once were willows, but now, owing to the attacks of cossus, musks, and

Fig. 171. End of Foreleg of ditto.

a host of other wood-boring insects, they are but wrecks in venerable decay. On these trunks last year there swarmed an immense number of musk beetles. I have taken or assisted to take nearly two hundred specimens, and there were always some collectors looking for them. It was difficult to believe that such a number of larvæ could ever have found accommodation in the old trees; and they certainly were not the only inhabitants, for to my knowledge two dozen specimens of the Goat-moth were taken at the same place. On these trees the musks used to sit five or six together, with their antennæ in such a tangle, that, if they had been trying to knot themselves together, they could hardly have succeeded better. It was not easy to detach them from the bark, into which they dug their hooked claws with great force, and then, while one was endeavouring to root them up from beneath, they would be off like a shot, and down some unfathomable crevice.

For the accompanying illustrations I am indebted to the pencil of my friend Mr. G. F. Smale, of this place.

Blackheath. EDWARD LEFROY.

ROCK STRIATIONS.

MY attention has recently been attracted to "Notes on Structure in the Chalk of the Yorkshire Wolds, by J. R. Mortimer, Esq.," a short notice of which was given in the abstracts of the proceedings of the Geological Society of London for May last.

The striation there referred to is found, I believe, in great perfection at Holywell, a place intermediate between Eastbourne and Beachy Head, confined especially to the hard chalk marl used by lime-burners. It first came under my notice some years ago, when my impression was that it was due to the rubbing of one block of the material against another in the process of elevation of the mass; but further examination of the subject has led me to arrive at a different conclusion.

In January, 1872, Dr. Ogier Ward read a paper on the subject at a meeting of the Eastbourne Natural History Society, in which he referred the appearances to the cause above mentioned, and exhibited specimens of green-sand rock somewhat similarly marked, but having more the appearance of true slickensides.

It is not easy, without examining the markings *in situ*, to obtain a clear comprehension of their character, but the following description may help to a conception of the appearance.

Wherever the rock has been fissured, the walls of the fissures display a sharp, straight striation, consisting of narrow grooves and ridges of different degrees of thickness,—an appearance such as might be produced by a very fine-toothed comb being drawn straight along the surface of a somewhat plastic surface. The striation continues uninterruptedly, however uneven the surface may be —over ridges and into hollows, and over surfaces many yards in extent.

In all cases, the direction of the striation on large blocks seems to be in the direction of the dip of the deposit. It is never perfectly horizontal, nor perpendicular.

Examined under the microscope, the ridges present a smooth appearance, somewhat resembling the surface of a stalactite, and are of a darker hue than the rest of the substance.

Wherever any lump of the marl is cracked

however fine the crack may be, the fragments in separation generally exhibit the striation on both surfaces of the interior, and the lines run in precisely the same direction on all the surfaces marked; thus showing the structure to prevail through the entire mass.

The appearances which have been above described seem to me to be inconsistent with the idea of their having been produced by the rubbing of one block against another under pressure. The effect of such rubbing of two pieces of marl would, I believe, be to produce a *smooth polished* surface, not a *rough striated* one, such as I have described; moreover, had the effect been due to any such cause, the markings would occur in every possible direction, without any uniformity; whereas in the case under consideration the markings for the most part lie in the direction of the stratum or deposit.

Without commenting on the various opinions held by geologists on the subject, I may briefly state that my own opinion at present is that the ridges in the striation are the exposed edges of thin layers of siliceous matter, or matter at least harder than pure chalk; and that they represent successive deposits of this harder matter. Wherever a block of the marl has been cracked so as to admit the entrance of the atmosphere, a slow weathering has taken place, which has resulted in the removal more or less of the softer parts of the original deposit, leaving the harder or siliceous ones exposed as ridges.

To produce this effect, the weathering must have been very gentle in its action, and continued over a long period of time. Full exposure of the surface to wind and rain would have produced no such effect; hard and soft parts would have alike yielded to the action, and no distinction in the shape of striation would have been observable.

The per-centage of siliceous and earthy matter in the marl in question is very large, as may easily be ascertained by dissolution of a fragment in dilute muriatic acid. The residue is dark, and does not become perfectly white by ignition.

C. J. MULLER.

SOME REMARKS ON TEA AND SLOE LEAVES.

ALTHOUGH there does not exist the same temptation to adulterate tea now there was in the olden times, when its cost was even more than as many shillings as what it is pence per pound, yet the abominable practice, rather than having been diminished in the like ratio with the temptation, has, if anything, only increased.* My object, mainly, is to illustrate and show by contrast the differences which exist, structurally, between the leaf of the Tea and that of—what at one time was its much-used substitute—the Sloe. In doing this it will be perceived that I have given prominence to the serratures of the margins, and their lateral venations, rather than to the general appearance of each as a whole. This, I have done designedly, since it is in these particulars more than in any other that the physiological points of difference reside. In what these differences consist will readily be seen by reference to the accompanying figures. Beginning with their serratures, then, it

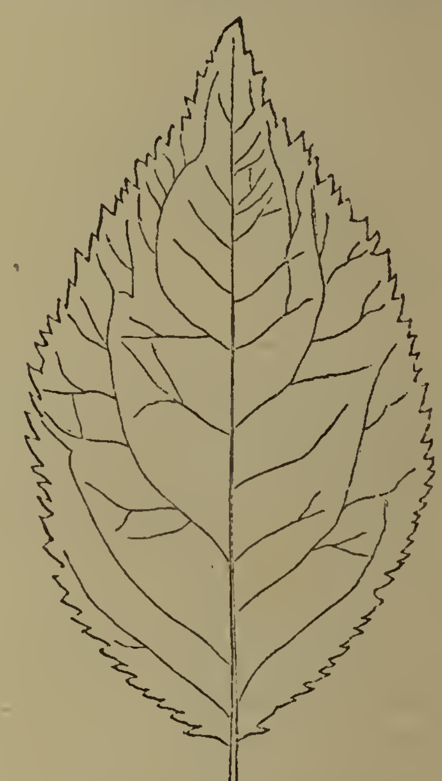

Fig. 172. Sloe Leaf (*Prunus spinosa*).

will be detected that those on the margin of the tea-leaf only take their rise from about a quarter to half an inch above its base, whilst in the leaf of the Sloe they are continuous from base to apex. I might observe further, too, that they vary in respect of their apices, which in the Tea is more or less visibly emarginate, according to variety, a particular that renders it out of all correspondence, botanically speaking, to the apex of the Sloe, which is acute. The other difference of character already alluded to, but undetailed by me, is that of their venations. These when viewed will, in that of the Tea, be noticed but to proceed from the midrib or central stem, to only within a short distance of the leaf's edge, in a recurvate manner. In the Sloe they are, on the other hand, in direct contact with the margin. For other and further differences take the leaves themselves. A superficial examination will soon discover to the botanic eye, a varying lamina, which in the case of the Tea will be found rather thick and somewhat coriaceous, in which the veinings are *immersed*, while in that of the Sloe it is comparatively thin and tender, with veining *prominent*. Continuing the examination further still, but microscopically, the stomata of

* This has reference to the use of tea adulterants generally, and not to the Sloe in particular.

the Tea will be found to be reniform in shape; but in the Sloe partaking of the more typical shape of semilunar form. Of these pores I may just here say, that they can be very easily observed, if a very thin piece of the skin of either of the leaves be cut off, and then placed on a glass with a very little water, under the microscope.

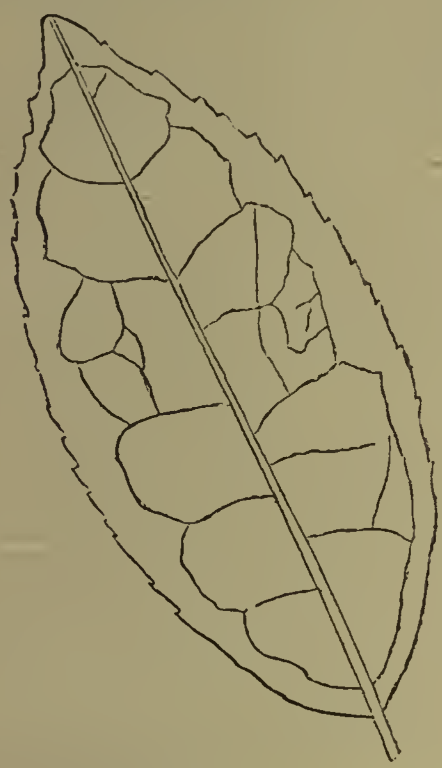

Fig. 173. Leaf of *Thea Bohea* (Black Tea).

Still again I might as well observe that even in a chemical sense the Sloe is eminently fitted as a substitute; for, excepting that it does not possess the active principle of tea,—theine, it can, in the proportions of all its other principles, be said to form

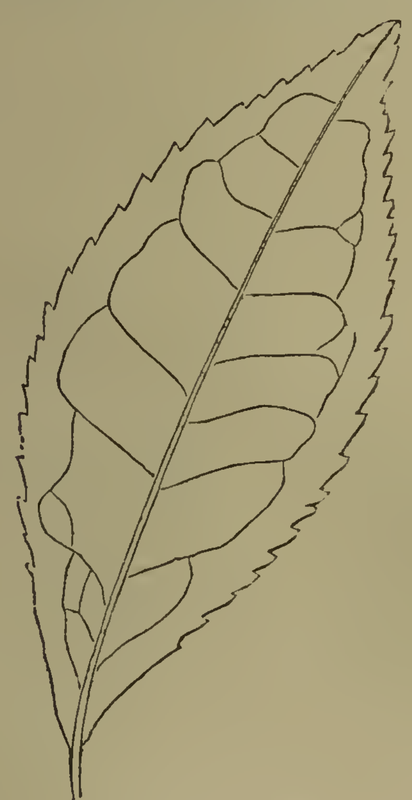

Fig. 174. Leaf of *Thea viridis* (Green Tea).

a very near approximate. So to this, as well as its physiological structure, and especially of its general outline, may be attributed in a great measure, no doubt, the success with which its illicit use has been, and doubtless still is, carried on, if not, perhaps, in the now absolute employment of it as a substitute, still in the less detectable, though none the less positive, way of an adulterant.

Besides the Sloe, we have the leaves of other British plants which may here be mentioned, as having been used in substitution of, and to adulterate with, the true Tea. Among others which could be named, are those of the Strawberry and the Sage. Still none of these, I believe, have been found so well adapted for the purpose, chemically and botanically, as that of the Sloe. I have somewhere read or heard too of the leaves of the Rosebay Willow-herb (*Epilobium angustifolium*) having been employed for similar purposes. "From the result of a Parliamentary investigation in 1835," says Professor Burnett, "it appears that upwards of four million pounds of fictitious tea are on an average commonly made in this country, and used to mix with that brought here from China. Within a few years this illicit practice, which had previously been carried on by stealth, was attempted to be legalized by taking out a patent for the preparation of British leaves as a substitute for tea, and an extensive manufactory established for this purpose." But the purchasing of this prepared leaf for the purpose of mixing with the tea sold as Chinese very soon got noised abroad, so was consequently suppressed, and large quantities detected in the progress of manufacture were destroyed. But for my own part, I would prefer any of these articles of British industry to any adulteration formed of a hotch-potch of catechu, sand, graphite, &c. &c., which have been and are still used by the fraudulent and dishonest trader for the low purposes of gain. And I think, as it has now become a somewhat contestable point among some chemists as to whether the whole of the active principle of tea is really imparted to water or not, whether yet the Sloe, or some other of our British plants, may not, after all, be found at some future time taking the place of that most cheering and non-inebriating beverage—Chinese tea.

The idea of skeletonizing some of these leaves (Tea and Sloe) has long since been entertained by me, but I fear, from the amount of tannin they contain, that it will be a task very difficult of accomplishment. JOHN HARRISON.

"IN the deepest gloom, where the trees shut out the sun, myriads of lights flit about, and twinkle like little stars. They flash here and there, and you might fancy that troops of fairies were carrying torches in their hands. But there are no fairies in the case; the lights are only the torches of the fire-flies that live in the recesses of the wood, and every night make a kind of illumination among the trees."—*Kirby's "Beautiful Birds, &c."*

CHAPTERS ON CUTTLES.

No. 1.

By W. H. Booth.

ONE of the first sights likely to attract the eye of a stranger walking along any of our metropolitan thoroughfares would probably be the large placards bearing a representation of a curious-looking creature with many arms and great staring eyes, which were to be seen nearly everywhere a few months ago. Most of us have doubtless paid a visit to these "monsters of the deep" in person; but certainly those who have not yet done so, and have any opportunities whatsoever, should not neglect to at once make a pilgrimage to their abode. The late erection of two large marine aquaria so accessible from all parts as they are, the one at Brighton, the other at the Crystal Palace, Sydenham, where the varied forms which tenant the seas of our British coast may be seen and studied, has brought before our eyes strange beings, of whose existence the majority of us had been in total ignorance. Of all the many creatures which astonish the eye and excite the curiosity of the observer in these aquaria, none are more generally the subject of interest than the Cuttles. Their eccentric motions, crawling about as they do over the rocks, and occasionally condescending to gratify the eyes of the beholders by displaying their mode of swimming, or rather darting, about in the clear water, furnishes an ever-changing subject of interest to all. The Octopus in the aquarium is a most brazen-faced monster, not seeming to be in the least disconcerted or otherwise affected by the presence of anybody, whereas some other inmates are just the opposite, being so extremely shy and bashful that they have to be supplied with strictly private apartments, there only visible to the select few. Perhaps, as so much interest is at present centred on these animals, a few words on their general forms and divisions may be of general interest to the reader of SCIENCE-GOSSIP. Many people are rather misty in their views of the relations of the Octopus, and this uncertainty has been rendered still more perplexing by a confusion of names. It may be as well to state at the commencement, that under the term "Cuttles" are included a great many different animals. Although nothing seems so dry as classification, yet, even at the risk of deterring my readers by the long names which our savans apply to their divisions, I must endeavour to give a slight sketch of those main sections with which we shall have to deal. Cuttles, or, to give them their scientific name, *Cephalopoda*, a name signifying "head-footed," are a class of the *Mollusca*. This is a fact which is rendered quite necessary to notice, from the great dissimilarity existing between the Cuttles and most other mollusks. There are certain characteristics common to all Cuttles, which it will be as well to mention. The most striking feature is undoubtedly the long arms or feet, which seem to be arranged in a circle around the head; hence the scientific name *Cephalopoda*. These appear to serve the double purpose of feet and arms, but it is in their use as arms that their peculiarity is most apparent. Cuttles, however, are not dependent on their feet for a means of locomotion, for that which they usually adopt is found in another member. If we closely observe an Octopus, we shall see a small sort of funnel proceeding from the body: this exactly corresponds with the siphon of the Bivalves, and is used by the animal in enabling it to swim. This funnel is to be found in all Cuttles; but some have also sets of fins, by using which they are able to progress rapidly through the water.

To understand the manner in which Cuttles progress by means of the funnel, we must examine a little more closely into their structure. We find then, after a little research, that they breathe water pretty much as we breathe air, and that it is the *forcible* expulsion of the water from the *branchiæ*, or gills, that gives them the power of swimming. A flow of water is continually passing through the gills; but this would not move the animal from its position. The gills are furnished with cavities capable of containing a large quantity of water, which, when compressed by muscles, rushes forth from the funnel, sending the animal along with great speed. Thus the Cuttles, when progressing after this fashion, go tail foremost, and carry their arms in a neat tapering bundle behind them. It is manifest that after the water contained in the branchial cavity has all been expelled, the animal must come to a dead stop: this it does, and appears more as if darting than swimming. The long sinuous arms, with their dreadful rows of suckers, are very effective in procuring food; some species, besides the suckers, are armed with hooks, which, when plunged into the flesh of their victims, have a terribly strong hold: but of these anon. Cuttles exist in countless numbers over the whole ocean. Some frequent the coasts, others the high seas, and others make annual migrations from place to place. With the exception of the *Octopus*, they are mostly gregarious and love the society of their kind; but being for the greater part nocturnal in their habits, are not so frequently seen as might be expected from their great numbers. They multiply at a prodigious rate, and are great pests to fishermen, seizing hold of the fish and devouring them with their horny jaws. The head is very loosely fastened on to the body, so as to allow more scope for the use of the arms; indeed a dead cuttle looks as if its head and arms were only joined on to the body by a loose ligament. There is, of course, no bone proper to be found in them; but the brain is protected by a gristly cartilaginous box, and sometimes a sort of incipient

backbone is to be found, corresponding in its nature and construction with the shells of mollusks. The sexes are distinct in the *Octopoda;* the males are *hectocotylized.* Such voracious creatures multiplying in such a large ratio would quickly depopulate the seas, were there no counterbalancing power at hand. The Cuttles have many formidable enemies, who decimate their ranks and help to preserve a proper equilibrium. Not the least formidable of these is the Cachalot, or Sperm Whale, a cetacean of huge proportions. Another enemy of the race is the Cod family, chiefly inhabiting the banks of Newfoundland. The bait used by the cod-fishers is generally a cuttle. The numbers caught by man alone for this purpose may be well imagined from the following data. In early spring, England sends forth to the cod-fishery about 2,000 ships, France 1,000, and America about 3,000. On an average each ship is reckoned to catch about 40,000 fishes, so that the amount of cuttles caught by man for bait must number several millions, and many more will be eaten by the Cod on its own account. Tunnies, dolphins, and bonitos devour them; various sea-birds seize them on the surface of the ocean; and lastly, man himself both eats them and more frequently uses them as bait for all kinds of fish. In tropical seas cuttles attain to an enormous size, although their magnitude in a great many instances has been much exaggerated. Péron saw one as big as a tun, near Van Diemen's Land, rolling about its great body in the water. A dead cuttle was found in the Atlantic whose weight, when perfect, must have been not less than two cwt.: this was floating on the surface of the sea, and partly devoured by birds. As for fiction, Pernetti mentions a huge monster which overturned a three-masted ship by climbing up the rigging! D'Orbigny relates that Denys Montfort having represented a "kraken octopod" performing the above feat, declared that if it were "swallowed," he would represent the monster embracing the Straits of Gibraltar. The "kraken octopod" is a Norwegian invention; it has a back a quarter of a mile in diameter, covered with sea-weed. It but rarely appears on the surface, but on one occasion, so the story runs, some fishermen landed, and lighted a fire, supposing it to be an island. The "kraken" must evidently have been slightly tickled by this, as it then sunk to the bottom with its human load. Pliny too does not fail to give us a description of a gigantic cuttle with arms thirty feet long, and so forth. In fact people seemed never tired of fabricating absurd stories of these animals; but with all this fabrication there is of course some little truth, all the stories being founded on large-sized cuttles, whose proportions either terror, or a desire to rival the story of Sinbad the Sailor, caused them to greatly exaggerate. Having now taken a general view, we will examine, in a future paper, the most interesting species. The arrangement will be found to be that of Woodward, in his "Manual of the Mollusca," a work whose practical value to the general conchologist cannot be too highly spoken of. The first division of the *Cephalopoda* is founded on the difference of the branchial systems, and is called the *Dibranchiata,* or two-gilled; the second the *Tetrabranchiata,* or four-gilled. All cuttles which are placed in the first division have two gills for breathing, while those placed in the second, of which there is at present living only one genus, the Chamber Nautilus, are furnished with four gills.

(*To be continued.*)

OUR LARGEST SALAMANDER.

(*Menopoma Alleghaniensis.*)

By Charles C. Abbott, M.D.

My companion excitedly uttered a word that would have shocked many of my readers. "Nothing else you know it by?" I asked, after a pause, during which we watched the slimy reptile move slowly along the muddy bank. "O yes, out in our rivers they are called 'Ground-puppies' by some folks, and 'Tweegs' and 'Mud-devils.'"

"That will do for a list—let's see if we can catch him."

We tried long and faithfully, but all in vain, and this queer creature still haunts the mouth of Belle brook, as it dances over shining rocks to join the brimming river.

I had never seen this creature before, which is not *naturally* an inhabitant of the Delaware, but my friend from Pittsburg was familiar with them. How they got so far east as New Jersey I cannot tell, but believe the travelling menageries have had something to do with it; for we have seen them exhibited at Trenton, N.J., as the Australian *Ornithorhynchus parodoxus!* Is not that a commentary, by the way, on our knowledge of zoology? The "Hell-bender" is not very abundant at any one locality, and judging from the conversations of the "oldest inhabitants," are much less numerous than formerly; but now that they have accidentally been introduced into the Delaware, perhaps they will prove "a success" numerically, as the Black-bass (*Gnystes fasciatus*) have certainly done; and let us hope also the same for the Salmon.

Here, in the Delaware, the Menopoma has an excellent appetite, and devours an astonishing number of small cyprinoids during the day. The little minnows (*Hybopsis procne*) have not yet go used to him, so are swallowed without ceremony by the ungainly but not clumsy creature.

Worms and crabs (*Astacus* and *Cambarus,* we suppose) are also said to be preyed upon by the Menopoma, but we have never seen him eat any-

thing but fish, while watching him in the river; and when kept in a tank, he left a large crawfish (*Cambarus affinis*) severely alone, after having taken one little smell and received one big tickle on the end of his nose. Of his breeding habits we have now nothing to say, but will keep on the look-out next spring for this "Mud-devil," and if he survives over winter and withstands the freshets with their miniature glaciers, perhaps we will learn something new concerning him, as twisting, squirming, jumping, he beslimes the green banks of little Belle brook, or deeply diving, he stirs up the sand from the bed of the beautiful Delaware.

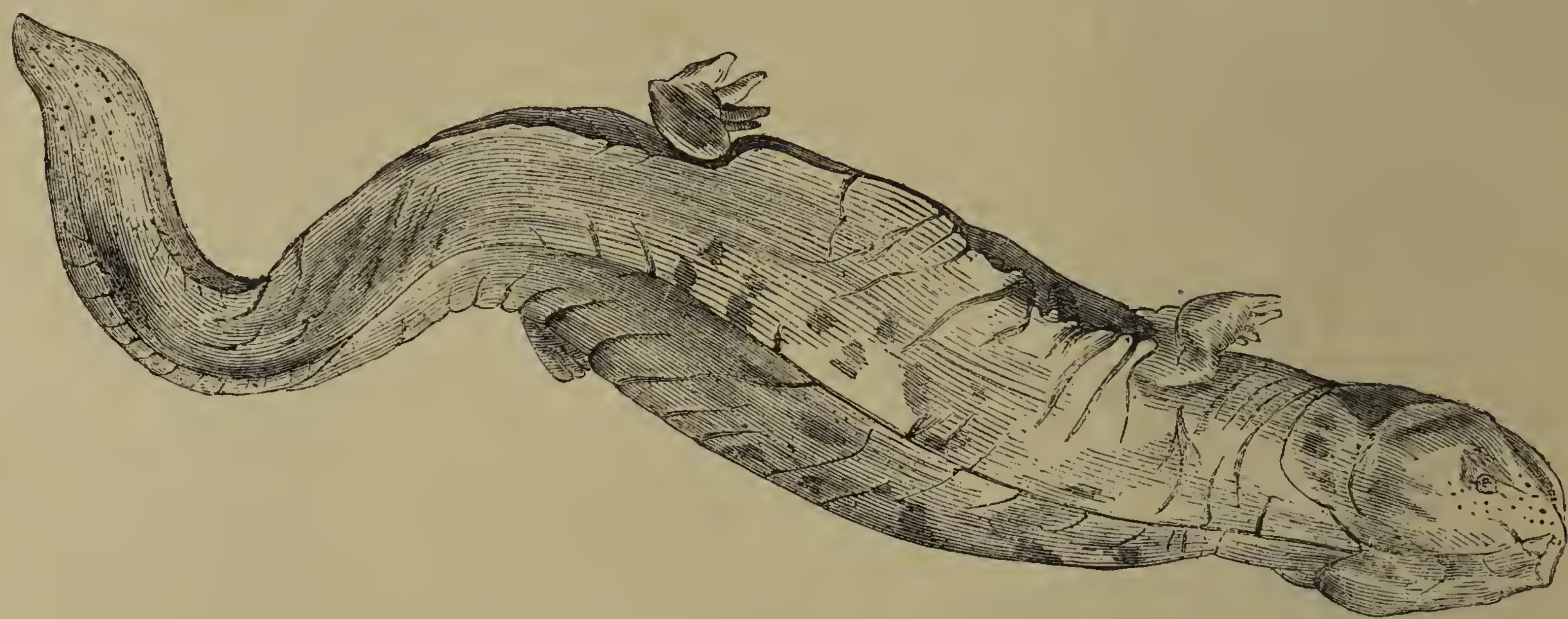

Fig. 175. "Mud-Devil" (*Menopoma Alleghaniensis*).

NOTES ON FOSSIL CORALS.

THERE are few objects obtainable by the geologist which possess greater interest than fossil corals; not only because the ancient forms differ structurally from modern, but also because they testify so plainly to ancient physical geographical conditions. We know, for instance, that except in the case of the so-called *single* corals, of which our own recent *Caryophyllum cyathus*, or "Cup-coral," is an example, all the compound forms affect shallow waters. If this was the case with the extinct forms, some of which belong to existing genera, then their presence throws great light on the circumstances under which some of our limestone beds were formed. Wenlock Edge, in Shropshire, is, according to Professor Owen, nothing but an ancient coral reef, in which the principal fossil corals are *Favosites polymorpha* and the beautiful "Chain-coral" (*Halysites catenulatus*), so called on account of the chain-like manner with which the tube-mouths are connected. In this respect it resembles the recent Music-coral (*Tubipora musica*), which, however, is placed in the order *Alcyonaria*.

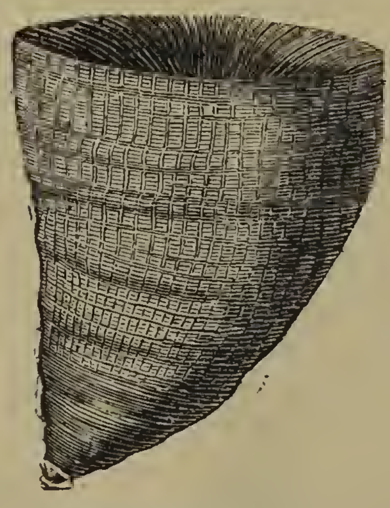

Fig. 176. Fossil Coral (*Zaphrentis cornicula*).

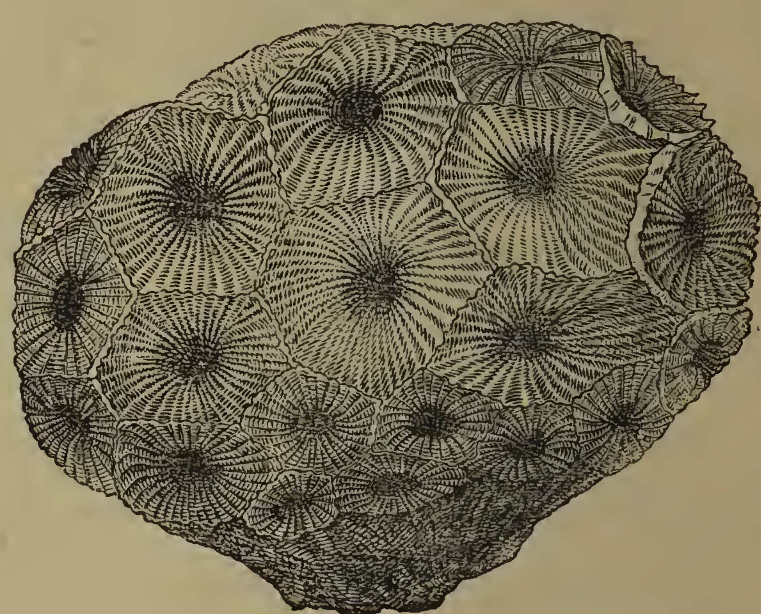

Fig. 177. Fossil Coral (*Cyathophyllum hexogonum*).

The extinct compound corals are grouped into a separate order called *Rugosa*, and are distinguished from the recent by a generally lower organization. In some respects they form an intermediate group between the true corals and the *Alcyonaria*. *Zaphrentis*—a genus common in the Carboniferous limestone—was evidently solitary, like our British "Cup-coral." There is a difference, also, in the number of plates radiating from the centre of the fossil and the recent corals. In one it is a multiple of four,

and in the other of six. There may have been a physical reason for this distinction, so that it is hardly fair to say, because our own reef-building corals, with a different internal structure, cannot live outside the tropical zones, the extinct fossil forms must have required a warmer climature than our latitudes now afford. The difference in structure may have been connected with colder and more temperate conditions.

Fig. 178. "Chain Coral" (*Halysites catenulatus*).

Still, the fact that reef-building corals were once abundant in British seas is a novelty. It shows us the presence of physical agencies now absent, whose

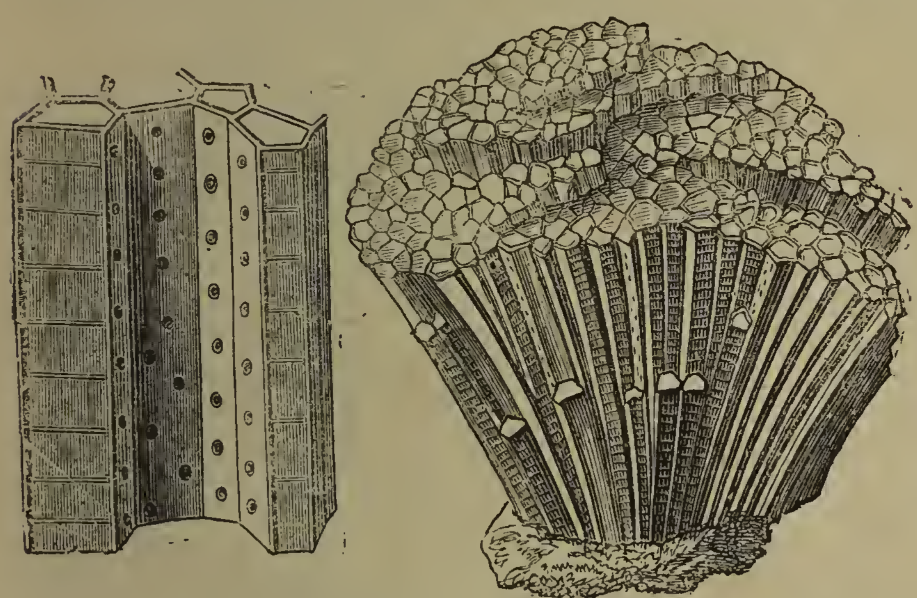

Fig. 179. Fossil Coral (*Favosites polymorpha*).

work resulted in the foundation of rock-strata that we are now proud to call part of "Merrie England."

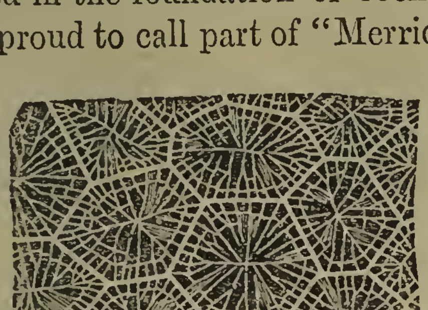

Fig. 180. Fossil Coral (*Stauria astræformis*).

The beautiful reddish limestones, of Devonian age, found in South Devonshire, are often composed of the remains of fossil corals alone. In Derbyshire you see the walls along the roadsides crowded with them. In Flintshire, above all places in Great Britain, you get fossil reef-building corals in the greatest degree of perfection. In fact, no recent forms brought home from tropical shores are more beautifully perfect. The best locality for obtaining these is in the limestone quarries near Mold. About Dudley, at the Wren's Nest, in the Silurian limestones, you may see the slabs densely covered with *Favosites* and other corals, many of them allied to one of the lowest genera of existing corals—*Porites*. The study of fossil corals is worth attention, not only on account of their genuine beauty, but also because of the important part they have played in laying the present solid "foundations of the earth."

J. E. T.

THE HONEY-BEE.

YOUR correspondent "J. T. R.," page 143, says, "I should like to inform Mr. Carr, whom I know by report to be an extensive Lancashire bee-master, that queen bees can and will sting human subjects." Now from long experience with handling hundreds of queens, I do not believe they have the power to sting a human subject, although they use their stings in combats with a rival queen. I should like to know if "J. T. R." was ever *stung with a queen bee*, or what evidence he has got for his statement?

"A. B." inquires, on page 189, "Whether the queen bee is ever impregnated in the hive," and T. O. Wood, on page 262, answers his inquiries correctly, but says, "Whether the drone dies after impregnation I cannot say." A young queen bee is generally impregnated the first fortnight of her life; but if she does not get impregnated before she is about a month old, she remains barren all her life, and can only lay unfertilized eggs, that will produce only drones, or male bees. The queen always pairs with the drone in the air, and the act has never yet been seen by mortal eyes. I have frequently seen my queens come out on their matrimonial excursions, and have sat down by the hive and noticed the exact time they have been out on their wedding flight, and I can always tell if one has been successful in meeting with a drone. If the queen returns unimpregnated, she will go out again the next day, if favourable, within a few minutes of the time she was out the day before. One impregnation serves the queen for her life, and fructifies more than half a million of eggs.

Many people say, as nothing is made in vain, why are so many hundreds of drones hatched, when only one is required to impregnate each queen? This is a wise provision of nature to insure the queen nearly

always meeting with a drone on her first excursion, as, if she often came out of the hive, a bird might pick her up, or she might meet with a thousand other accidents, and in that case, although there might be thirty thousand bees in the hive, they would all die, as at that time they have no eggs or brood from which to raise another queen, and all the prosperity of a hive depends on that all important female the queen.

At the end of July, when all swarming is over, and the bees have no further use for the drones, they kill them and turn them out of the hive; and it is very interesting to see a small working bee (in a unicomb hive) seize a big burly drone; and he runs up and down, dragging the worker with him; but it sticks to him like a weasel on a rabbit, until it bites a piece out of his wing, or he goes out of the hive, falls down, never to rise again. The bees will have no lazy idle fellows in their hive, that never do a stroke of work of any kind, but rob and live upon the industry of others. It would not be a bad thing if the *Human Hive* took a lesson from the bees (and they can teach them many a wise thing) and acted somewhat in a similar way.

"J. A.," on page 190, says: "A stock of bees belonging to John Pender, Esq., at Minard Castle, sent out a swarm of bees on May 28th, which shortly returned again to the hive, and came out again at intervals of a day or two for six successive times." In this case the old queen was injured in some way that prevented her flying out with the swarm, and they, missing her, soon returned; but when they swarmed the last time, the young queens had come to maturity, and went out with the last swarm, which was hived and settled. It is not a very uncommon thing for a swarm to go out without the queen, but they always return again. This is an illustration of the great advantage bar-frame hives have over all others, as with them every comb in the hive could be examined in five minutes, and the true state of the case ascertained.

Our dear old friend William Augustus Munn is no more. He died rather suddenly on Sunday, October 10th, in the sixty-third year of his age. He had a good, kind heart, and did a great deal to raise bee-keeping to the perfection it has now attained; and although Huber was the inventor of bar-frames, —but his frames were an inch thick, and when put together formed the ends and top of the hive,— Major Munn was the first to put bar-frames with a box or case, in 1834, the same as the modern bar-frame hive, which has raised bee-keeping in such perfection as to become of national importance in many countries in the world.

The Major took out a patent for his hive in Paris in 1843, and wrote a pamphlet on bees in 1844, and another edition in 1851; and to crown his long labours, in 1870 he reprinted his friend Dr. Edward Bevan's work on "The Honey-Bee," which is the most scientific work on bees written in England. Major Munn has also written a great many articles for the journals and magazines in this country and in America.

We can now only deplore the loss of our dear friend, with the matured vigour of his pen and intellect no more to be used for SCIENCE-GOSSIP.

WILLIAM CARR.

Newton Heath, near Manchester.

MICROSCOPY.

PREPARING FORAMINIFERA.—Your correspondent "B. M." asks for an approved method of collecting and preparing foraminiferous chalk. Usually in the information given on this subject too little is said about the method of collecting, for when once a good gathering is made, the preparation is easy. Let us go into a chalk-pit, and look for recently excavated, large flint nodules, of irregular form: the cavities between the flinty "fingers and thumbs" will generally be found filled up with light powdery chalk. Take this out carefully right back to the farthest part of the recess. Now examine a freshly-exposed section of a flint stratum; good material will be found in the "flint-holes" laid bare by the quarryman's pick. In a few words, search for foraminifera in all places where the delicate shells have never been exposed to pressure. After a little practice it is easy to determine good chalk from bad, by the sense of touch only: if it powders freely with a rolling feeling between the finger and thumb, be sure your sample is good. In the cavities of hollow spherical flints may be found much of interest,—spicules, spongites, zoophytes, minute corals, &c.; but the foraminifera are generally more or less silicified, and do not show so well as those gathered from the cavities, which are really outside the flint. A rough examination of your samples is best made by taking a pinch of the chalk and washing it in a test-tube; and by a process of levigation dividing the fluid and suspended chalk into three or four lots: by this means you find out whether your sample contains large or small specimens, and in what quantity. Having pitched upon your best gathering, take more pains in your washing process; and the shells may be obtained as clean and unbroken as could be wished. I like them best in balsam, using ½ or ⅕ objective binocular, with light modified by passing through ground glass of a pale blue tint. If "B. M." will send me his address, I shall be pleased to forward a slide of chalk from Guildford.—*Arthur Angell, F.R.M.S.*

THE TADPOLE OF THE NEWT.—There is no more beautiful sight under the microscope than the circulation of the blood, and in order to view it to the best advantage I know no subject superior to

the Tadpole of the *Newt*. The circulation can be seen in almost any part of the animal, but to best advantage in the tail, and especially the gills. There is one difficulty, however, in observing it, owing to the continual motion of the animal. This can be overcome in the following manner, which although not new, may be so to many. Place the subject in a small vessel of any kind, with about enough water to cover it, and to this add a few drops of *hydrate* of *chloral* (a saturated solution in water). When the right quantity is used, it generally takes a few minutes to render the animal quiet, and it may then be placed in the slide or cage with a little fresh water for examination. Care must be observed not to use too much of the chloral, or the subject will be killed; but with judgment the same animal may be used any number of times. It should be placed in fresh cold water afterwards, when resuscitation will take place. The newts can be obtained in the autumn and kept through the winter.—*Thos. H. Saunders, Philadelphia, U.S.*

"Half-Hours with the Microscope."—A handsome new edition of this valuable little work has just been published by Hardwicke, 192, Piccadilly, to which a "chapter on the Polariscope" has been added by Mr. Fred. Kitton, of Norwich, illustrated by a beautiful chromo-lithograph plate of the principal polariscopic objects. We need hardly say that, with this useful addition, "Half-Hours with the Microscope" may take its place among the most useful, and certainly the cheapest, works offered to the public.

Mounting Dry Objects.—In books I have seen on mounting objects for the microscope, I find it recommended to place covers on slides with forceps. I like to see such things done neatly and truly centred, and will describe a simple and easy way I have of putting on covers truly. In mounting objects dry, I put a ring of asphalt varnish on the under side of the cover, by sticking the cover to a glass slide with water and putting it on a turntable; when it is sticking, I put the slide on a piece of wood 3 inches by 1 inch, and about 1 inch thick, to raise it above the table, and holding the glass, with the cover stuck to the under side, across the slide, press the cover down carefully in the right place, and fasten it with a clip till it is dry, when a touch will easily detach the glass to which the cover was just stuck. I make my piece of wood with pieces cut out on the under side, so that when I put a glass on the top I can hold it with elastic bands. Under the glass, in mounting, I place a card 3 inches by 1 inch, with a hole punched out of the centre; under this hole I put blue, black, or white paper, to show up the object, and assist in placing it truly: several cards, with holes of different sizes, are useful—they are easily made.—*W. L.*

Oil of Cloves.—I have lately found this material of service in the examination of some forms of diatoms, especially where the valve has been too thick for examination in a dry state. The high refractive index of oil of cloves renders the fine markings much more distinct than even hard Canada balsam; unfortunately, however, I fear that this medium cannot be used for permanent mounting.—*F. K.*

ZOOLOGY.

The late Major Munn, F.R.H.S.—This eminent bee-master has been removed from us by death, which took place lately, at a ripe age, at his residence, Churchill House, near Dover. At the last meeting of the East Kent Natural History Society, the hon. sec. (Professor Gulliver, F.R.S.) proposed, and Colonel Horsley seconded a motion, which was cordially carried, that the high esteem entertained by the Society of Major Munn's memory be entered on the minutes, and communicated to his widow. The loss to apiarian science generally, and to the East Kent Natural History Society particularly, is one that will be long felt. Major Munn's zeal and success in his favourite pursuit were such as an enthusiast only could exercise and attain. It has been often remarked that genius generally partakes of a smack of enthusiasm; and Dr. Johnson asserted that the man who contrives to do best what many men do well must command respect. And thus viewed, the scientific character of Major Munn will appear as respectable as his moral character was amiable. His contributions to the life-history of his favourite insect—the Honey-bee, were as numerous as they were interesting, and were all marked by the stamp of a cultivated and active mind, and by the practical and useful nature of his observations. His additions to the late Dr. Bevan's work on the Honey-bee (published by Van Voorst) are too well known to require description; but the surprising knowledge possessed and practised by Major Munn in the management and handling of bees was best known to his most intimate acquaintances; and his sagacious familiarity with the points in the anatomy and physiology which are most likely to advance our knowledge of the recondite instincts and habits of these important insects, was always remarkable. Of this his many valuable communications to the scientific meetings of the society afford abundant evidence. And it is a melancholy fact that the last public exhibition of his enthusiasm and zeal in apiarian science occurred at a late scientific meeting of this society. On that occasion he produced such experimental proof as had never previously appeared before any public meeting, that the Queen Bee, though capable of injecting poison with fatal effect into the breathing-apertures of

her rival in a combat, is utterly unable to injure by puncture or penetration of the sting any part of man or beast. The fact, if fact it be, will prove equally novel and important; for bee-masters and experimental physiologists would be able to handle Queen Bees with perfect impunity; and in a teleological point of view, which would have delighted Paley, he has thus advanced the opinion that the weapon of the Queen Honey-bee is only adapted or designed for a single and special purpose. These, and numberless other kindred observations, afford good evidence of the originality of Major Munn's mind, and of the great loss which the society has to deplore in his death.

Hippocampus (Sea-horse).—In the last number of Science-Gossip, Mr. Brittain states that these fish have recently bred in the temporary tanks of the Manchester Aquarium Co., and he adds, "it is quite certain that it is the first time that the Hippocampus has been bred in a public aquarium." Now, so far from this being the case, the Hippocampus has bred in at least *three* other public aquaria: first, at Vienna, in 1860; secondly, at Paris, in the aquarium of the Jardin d'Acclimatisation; and lastly, at the Crystal Palace aquarium, in the summer of 1871; when, as Mr. Lloyd informs me, the young were immediately eaten by their parents. However, although the Hippocampus has bred so readily in confinement, the young have never arrived at maturity, being either eaten by their parents or destroyed through lack of nourishment of sufficient minuteness to compensate for their wants.—*Walter T. Ogilvy.*

Poison of Spiders.—In your issue for November I notice "F. F." inquires whether white matter which he saw hanging from the aperture at the end of a spider's fang could be the poison of that creature? A reference to Mr. Blackwall's "Researches in Zoology," an excellent work, which should be in the hands of all naturalists, leads me to think that the secretion alluded to by "F. F." was not the spider's poison. At page 240, and a few subsequent ones, Mr. Blackwall mentions this poison as a *transparent colourless fluid* emitted from the minute orifice situated near the extremity of the fangs on the side next to the mouth, when those instruments are employed to inflict a wound. As far as I can make out, the author nowhere adverts to the fluid as being white. At page 315 Mr. Blackwall writes: "A male Agelena labyrinthicus, confined in a phial, spun a small web, and among the lines of which it was composed I perceived that a drop of white milk-like fluid was suspended: how it had been deposited there I cannot explain, but I observed that the spider, by the alternate application of its palpal organs, speedily imbibed the whole of it." But for further information upon this interesting subject "F. F." is referred to the author's book; or, I doubt not, even fuller particulars are given in his work on "Spiders," published by the Ray Society,—the best treatise ever written in this country, if not in Europe.—*John Colebrooke.*

Vanessa Atalanta.—In reply to "E. D. M.," p. 263, I should imagine that the scarcity of this insect is local only, as I found plenty of them this autumn as usual in my garden, which abounds in arbutus-trees, a very favourite resort of Atalanta. —*E. B. K. W.*

The Spotted Ray.—The Brighton Aquarium has solved another interesting question in natural history. A young Homelyn, or Spotted Ray (*Raia miraletus*) has been hatched from an egg laid in one of the tanks in the first week of June last. Five months appear, therefore, to be the period of development of this fish in the egg. The young spotted dogfishes, of which more than eighty are now thriving well and growing fast, were not hatched until six months after the eggs were laid.

Rare Birds in Scotland.—The Duke of Sutherland has prohibited killing birds of the eagle and hawk tribe, or taking their eggs, on his Sutherland estates, on account of their rapid decrease. His keepers have frequent offers from egg-collectors of £5 for a golden eagle's egg, and about £2 apiece for the eggs of other rare birds of prey. In one instance a golden eagle's egg taken in Scotland, and purchased from the keeper at five guineas, was resold for £10.

Helix obvoluta.—Some years ago I found the shells of *H. obvoluta* in a wood near Winchester, twenty miles west of the habitats mentioned in Tate's "British Molluscs." During the present year a more careful search has led to the discovery of living specimens in various stages of growth. Can any correspondent inform me—1st, whether this is a new habitat; 2nd, whether the species is met with in France; and 3rd, what is its geographical range?—*C. Griffith, Winchester.*

Preserving Actinia.—I observe (p. 240) that "R. M." asks for a method of preserving sea-anemones for collections. I only know of one plan proposed, viz., that mentioned by Mr. Davies in his "Practical Naturalist's Guide," p. 53. "The actinia is allowed to remain in sea-water until nearly dead. While the tentacles are completely distended with sea-water, the animal is gently lifted into a smaller vessel, and the end of a glass tube of suitable size, and previously filled with glycerine, is pushed in at the mouth, and the contents forced into the body by blowing. The tube is again and again filled and applied, until the fluid which exudes at the points of the tentacles has lost its saline; the surrounding fluid is then removed, and replaced with glycerine.

Large specimens will require to have the glycerine again changed before fastening up the preparation, which may be done in a month." Mr. Davies speaks of this as an experimental plan, not as a certain method.—*E. B. K. W.*

Ants and Aphides.—A singular fact connected with the Ant and the Aphis has lately been brought to my notice, which, if it has not been already observed, may be worth recording. My informant (a Brighton florist) assures me that he has frequently observed the ants carrying down the aphis from the upper part of the plants to the bottom near the roots, and that a great number of them may be seen at times on the mould around the root, and even in the entrance to the ant-holes in the flower-pot, the lower part of which, being sunk in the mould, the ants find their way through the hole at the bottom to the top of the pot;—can it be to give the ant more ready access to the aphis in order to collect the honey when ejected by the latter?—*T. B. W.*

Hydras benumbing or killing their Prey.—At the meeting of the East Kent Natural History Society I showed under the microscope the effects of the stinging properties of the *Hydra viridis*, by placing several of this species in a glass cell a quarter of an inch deep and one inch and a quarter in diameter, and then putting with them some lively specimens of *Cyclops quadricornis* and water-fleas. They were instantly seized by the hydras with their tentacles, and in the space of half an hour not a single cyclops or water-flea was left living. The hydras not only killed the prey they swallowed, but every one that came in contact with, and was held for a short time by the tentacles, also died, even though released from it; and the victim never recovered from the sting of the hydra. As the stinging power of the hydra has been hitherto a vexed question, I have had recourse to various experiments to prove this, and the plan adopted, as before mentioned, has fully confirmed the fact that they have the power to kill not only that which they appropriate to themselves as food, but all and every one that comes in contact with their tentacles. The hydras in question were placed in the cell with perfectly clean water, in a short time they extended themselves and their tentacles to their full length; soon as the *cyclops* and *daphnias* were put into the cell with them, they were immediately entangled in the extended tentacles. Some of the hydras laid hold of four and five at a time, and retained them while the process of absorbing one only went on, and by the time this was accomplished all the others were dead. This was witnessed by the whole of the members present at the meeting. I had tried this experiment several times before, and with the same results.—*James Fullagar, Canterbury.*

BOTANY.

Calla palustris.—During a temporary sojourn, this autumn, in the neighbourhood of Cobham, Surrey, my attention was one day attracted by a somewhat remarkable leaf, growing out of the water, on the edge of a peaty swamp, among the uninclosed fir woods, which extend for some miles in that district. Later, I observed flowers of so peculiar a character that I was induced to return another day, with the means of reaching the plant. It proved to be *Calla palustris*, a European, but not a British native. Probably it must have been planted or sown there, some time or other; but, to all appearance, it is growing perfectly wild, and is now spread over a space of some 25 yards along one side of the swamp. I made many inquiries to ascertain whether it had ever been seen there by any botanist, but could hear of nobody who was aware of its existence. Being assured that some record of the fact would be acceptable to your readers, I have sent this notice.—*Francis B. L. Gardiner.*

Hertfordshire Plants.—*Sagina maritima*, var. *densa*, is given by Dr. Hooker in his "Student's Flora" (p. 61) for "Cheshunt and Wisbech." This, however, looks very much like a clerical error for "Christchurch, Hants, and Wisbech, Cambridgeshire," of Syme ("Eng. Bot.," ed. 3, ii. 117), and the locality is in itself improbable. Can any of your correspondents help me to the reference? *Ranunculus heterophyllus*, Fries, and *Amaranthus retroflexus*, L., are also given for the same county in the "Flora of Middlesex" (pp. 249, 353). This latter is also recorded as a Herts plant by Mr. Watson in the "Compendium of the Cybele Britannica," apparently on the authority of the Rev. R. H. Webb's "Flora Hertfordiensis," where, however, it is unmentioned; and I am not aware that it has been collected there previously to the present year, when I gathered it myself on the North-western Railway, near the Watford station. Where are the other localities?—*R. A. Pryor.*

Fungus New to Britain.—At a meeting of the Eastbourne Natural History Society, Mr. C. J. Muller brought before the notice of the members a fungus said to have made its appearance in England for the first time during the present year. It is named *Puccinea malvacearum*, and was found on the under side of the leaves of the common mallow.

On the Botany of Brighton.—There are probably few places that present at first sight a more unpromising appearance to the botanist than the immediate neighbourhood of Brighton. Nevertheless, even in the town itself, Nature has contrived to retain a lingering hold upon the soil, and her traces will still be found amidst the most unpropitious surroundings.

The following plants occur, among many commoner species, beneath the concrete wall of the Marine Parade, between the Aquarium and the eastern extremity of Kemp Town. The station is of course, at present, hardly a natural one; but even thus some conclusions may perhaps be drawn as to the original flora of the locality. It is probable, however, that the works connected with the new road now in course of formation will lead to the extirpation of not a few of the plants included in the annexed list; and indeed already this autumn I have failed to find *Centaurea calcitrapa* in the station named, although it still holds its ground a little farther to the eastward, between Kemp Town and Blackrock. *Diplotaxis muralis*, D.C.; *Spergularia neglecta*, Syme; *Medicago maculata*, Sibth.; *Trifolium fragiferum*, L.; *Centaurea calcitrapa*, L.; *Carduus marianus*, L.; *Leontodon hirtus*, L.; *Plantago coronopus*, L.; *Beta maritima*, L.; *Atriplex Babingtonii*, Woods. A long list for so unlikely a locality.—*R. A. Pryor.*

Rare Plants.—It may be interesting to some botanists, who at any future time may visit Jersey, to know that *Ranunculus ophioglossifolius* is extinct at St. Peter's Marsh or Goose Green, the marsh having been drained. *Ranunculus chærophyllos* is to be found near St. Brelade's Bay. This somewhat compensates for the loss of the former. *Allium sphærocephalum* still grows plentifully on the sands of St. Aubin's Bay, though the railway has cut through where it was most plentiful. *Œnothera odorata* grows in the same locality with the above. *Diotis maritima* is to be found at St. Ouen's Bay, and I also found *Bupleurum aristatum* on the hills above the bay, growing with *Thesium humifusum*, a new locality I believe for both plants. *Helianthemum guttatum* is plentiful on the hills near St. Brelade's and St. Ouen's bays.—*Thomas Bates Blow, Welwyn, Herts.*

The Sea-Buckthorn.—On a visit to the east coast of Norfolk last month (Oct.), I saw growing on the sand-hills between Scratley and Hemsley, for about half a mile in extent, an abundance of *Hippophae rhamnoides*. In some spots they were clumped together in dense masses, and at that time were covered thick with orange-coloured berries, which contrasted beautifully with the silvery-looking leaves of the plant. This shrub belongs to the Elæagneæ order, and is diœcious. The two sexes are upon different plants. The inconspicuous flowers are produced on the old wood, in the spring, in the axil of the young leaves. In the male flowers the calyx is composed of two equal roundish lobes, four stamens very short, with rather large oblong anthers. The female has an oblong tubular calyx, slightly cloven at the top, containing a single germen, with a short, thick, recurved style. The berry somewhat elliptical, orange-coloured, very juicy, acid, and astringent, containing an oblong shining black seed, with a groove on one side. The leaves are of a silvery white beneath, like the back of a looking-glass, occasioned by the abundance of the radiating hairs, or scales, which make beautiful microscopic objects. The upper surface of the leaves is of a dark green, scattered over with similar scales. The wood is hard, and the branches of the preceding year terminate in stiff thorns. This plant is distributed through the north of Europe and central Asia. In Russia it is found in low sandy situations, more particularly in the subalpine districts about the Caucasus, and it is abundant throughout a great part of Tartary, where the inhabitants make a preserve of the fruit, and serve it up with milk and cheese as great dainties. In Sweden and the south of France an acid sauce is made of the berries, which imparts a grateful flavour to fresh fish. In Dauphiny (a former province of France) a decoction is made from these berries to remove cutaneous eruptions. Sheep will feed on the leaves and berries in poor maritime pastures. This shrub is extremely useful on the sea coast, as, by its roots and suckers, which it freely sends up, it helps to fix the drifting sand, along with the Marram (*Psamma arenaria*) and other sea-grasses. It may be planted in elevated and exposed situations, where few other shrubs will grow. When trained to a single stem it forms a very interesting tree, but will not produce fruit unless both sexes are planted contiguously. Loudon mentions that in his time there were some large trees at Syon, one of which was 33 feet high, with a trunk 11 inches in diameter, and a fine head 17 feet in diameter. There was also a male plant near the palace at Kew, 25 feet high. The English names for this plant are Sea Buckthorn, Sallow Thorn, and, in Norfolk, Wirwivvle.—Query from A.-S. *wir*, a myrtle, and *wifel*, a barb, or arrow?—*H. G. G.*, 12, *Hunter-street, Brunswick-square.*

Botanical Signs—Our correspondent E. C. Lefroy, referring to the signs used by naturalists to denote sex, is, I think, mistaken in associating the feminine sign with the goddess Ceres; it being clearly the astronomical symbol of the planet Venus.—*Thos. Agar.*

Febrifugal Properties of Gum-trees.—The *Daily Telegraph* has published the following remarks on this important subject:—At the last meeting of the French Academy of Science, a very interesting paper was read by M. Gimbert. Its subject was the alleged febrifugal properties of the Australian tree, *Eucalyptus globulus*, which is said to have the curious and valuable power of destroying the malarious element in any atmosphere where it grows. The species in question is one of that

family indigenous to New South Wales, which the colonists call gum-trees. They shoot up very quickly, and to an enormous height, some of them reaching one hundred and fifty feet, with a girth of from twenty-five to forty. The sparse and strangely-twisted foliage grows in a thin crown at the top of the pillar-like stem, but the characteristic of the whole *genus* is the rapid habit of increase, seen equally in the "iron-bark," the "blue-gum," and this particular specimen, the *Eucalyptus globulus*. The tree in question absorbs an immense deal of water from the earth, and at the same time emits an aromatic odour; which has perhaps something to do with the beneficial influence attributed to it. Where it is thickly planted in marshy tracts, the subsoil is said to be drained in a little while as though by extensive piping. Miasma ceases, we are told, wherever the *Eucalyptus* flourishes. It has been tried for this purpose at the Cape, and within two or three years has completely changed the climatic condition of the unhealthy parts of that colony. Somewhat later, its plantation was undertaken on a large scale in various parts of Algeria. At a farm twenty miles from Algiers, situated on the banks of a river, and noted for its extremely pestilential air, about 13,000 eucalypti were planted. In the same year, at the time when the fever season used to set in, not a single case occurred; yet the trees were not more than nine feet high. Since then, complete immunity from fever has been maintained. In the neighbourhood of Constantina, it is also stated, was another noted fever-spot, covered with marsh-water both in winter and summer: in five years the whole ground was dried up by 14,000 of these trees, and farmers and children enjoy excellent health. Throughout Cuba, marsh diseases are fast disappearing from all the unhealthy districts where this tree has been introduced. A station-house, again, at one end of a railway viaduct in the department of the Var, was so pestilential that the officials could not be kept there longer than a year; forty of the trees were planted, and it is now as healthy as any other place on the line. Such are some of the facts brought forward by M. Gimbert. If they are well-established, it would be most desirable to try whether the *Eucalyptus* would thrive on the West Coast of Africa, and other malarious districts of the warmer latitudes. It is affirmed that the Sun-flower possesses a similar capacity to dry up the subsoil and neutralize miasma. Nor should botanists neglect these suggestions. There are more wonders yet in the vegetable world than are dreamed of in their philosophy. How passing strange, for example, is that property of the papaw-tree, to turn meat tender! A joint of mutton, steeped in a solution of its juice, becomes instantly succulent, and the flesh of animals fed upon its leaves "melts in the mouth" upon cooking.

GEOLOGY.

Missing Links.—Some of the most interesting discoveries made during the past summer by Dr. Hayden's exploring party are due to the labours of Professor Cope in paleontological researches among the Bad Lands of Colorado, United States. The remains are even more interesting than in the similar regions of Wyoming. They have been found to be a vast graveyard of animals belonging to a long past period of the earth's existence. Up to the present time, Professor Cope has proved the existence of more than 100 species, represented by thousands of individuals. Of these, at least seventy are new to science. They range from the size of the mole to nearly that of the elephant. Sixteen species are reptiles. Many forms of insectivorous animals, related to the mole, and of very small size, have been procured. The delicacy and minuteness of these fossils is surprising. Gnawing animals, or rodents, left numerous remains of eighteen species, some no larger than the domestic mouse. Some were the predecessors of the rabbits, some of the squirrels, and some of the mice. Of cloven-hoofed quadrupeds, a great many have been found. Some were nearly intermediate in structure between the deer and the hog. Like the latter, they had no horns. They were about as large as sheep. Others were about the size of grey squirrels, being the smallest of this class of animals ever discovered. Several species of horses were living during the same period, as is proved by the bones and teeth which have been obtained. Their relative, the rhinoceros, abounded in Colorado in former days, no less than seven species having been procured by Professor Cope. One of the specimens is a perfect skull, with teeth complete, and covered with the moss-like crystallization seen in the moss-agate. But the most remarkable monsters of the past whose existence has been disclosed by this summer's survey are a series of horned species related to the rhinoceros, but possessing some features in which, according to Professor Cope, they resemble the elephant. They stood high on the legs and had short feet, but possessed osseous horns in pairs on different parts of the head. One of the largest species had a large horn over each eye, while one had another on each side of the nose, more than a foot in length. A third one, of a larger size than the last, had rudimental horns on the nose. Another was as large as the elephant. Its cheek-bones were enormously expanded, and its horns were flat. A fifth species had triangular horns, turned outwards. Their structure is regarded as disposing of the statement that the presence of horns in pairs is an indication of relationship to the ruminating animals, for these beasts are allied to the rhinoceros. Carnivorous species were not rare in this ancient family, and served, as now, to check

the too rapid increase. Of the fourteen species known there were tiger-cats, dogs, hyænodons, and the tomarctos, a new genus founded by Professor Cope. It resembled the dog, and was as large as the black bear, but it was much more carnivorous in its propensities. The reptiles embrace turtles, lizards, and snakes. The last two orders were discovered for the first time in this formation in America. Within the last few years Professor Cope has obtained from the ancient sea and lake deposits of Kansas, Colorado, Wyoming, Idaho, &c., about 300 species of vertebrate animals, of which he has made known to science for the first time more than 200. The history of the succession of life on this continent will be still further elucidated by proper investigations of the specimens preserved.

How to Mount Fossil Foraminifera.—Take a lump of chalk weighing about a quarter of a pound, and break into small fragments about the size of a filbert. Next take a fine piece of linen, put into it the small pieces of chalk, and tie it tightly, as you would do a sack of flour. Immerse this into a vessel containing a gallon of clean water, and let it stand during a period varying from five to six hours; at the expiration of which time the small pieces of chalk will be found to have lost their solidity. Should there, however, remain any portions undissolved, work them between the finger and thumb gently, when they will easily be reduced. Agitate the mass in water, always taking care to change the water and keep it clear, until the milk-white colour disappears, when the residue in the rag will be found to consist of the various species of foraminifera, and those other forms commonly discovered in chalk. Another way, and perhaps not so tedious as the foregoing, is to take a piece of clean chalk, and, with a stiff brush, such as a tooth-brush, rub off some of the powder over a glass of clear water. Carefully gather the residue collected at the bottom of the glass, which invariably contains the finer kinds of foraminifera. If necessary, again wash well in a two-ounce phial half filled with water; let it stand until the organisms have fallen to the bottom, when draw off the liquid by means of a siphon or wet thread. It is by far the better plan for those living in the district of the chalk cliffs to collect a small quantity of the dust which, worn from the cliffs by the rain and action of the air, accumulates at the base. The most valuable collections of organisms are generally selected from such gatherings. Foraminifera can be mounted in two ways, viz., dry and in balsam. When they are large and opaque, it is by far the better plan to mount them dry in a cement-cell sufficiently deep to contain the organisms. To view the structure, &c., it will be necessary to make sections, when the marking and general structure will be easily distinguished with the low powers; thus supplying a selection of slides at once both interesting and instructing. The second method—the Canada balsam media—is useful in preserving the transparent and finer kinds of foraminifera. When the subsidence is in water, take up a small drop by the aid of one of the pipettes, without which no microscopist should be, and place a small portion of the water containing the forms in the centre of the slide. Evaporate the water by heat, add a little turpentine and submit to the action of the air-pump to get rid of the air-bubbles. The spirit will soon evaporate; when add balsam in the usual way and place on the glass cover.—*J. P. S.*

A New Foraminifer.—Mr. H. B. Brady, F.L.S., F.G.S., of Newcastle, in a paper read in section D of the British Association, described a new type of carboniferous foraminifera which he had detected in some carboniferous limestone. These organisms do not occur in any great quantity, but specimens may be generally found in the *débris* of fossiliferous limestone beds. The author describes these forms as lenticular discs about the $\frac{1}{25}$th of an inch in diameter and $\frac{1}{50}$th of an inch in thickness, and never quite symmetrical. They often present an appearance of laminated structure; and in this, as in some other features, present a superficial resemblance to small nummulites. It was only by means of sections and microscopical examination that their true nature and affinities could be detected. The interior will be best understood by comparing it to a tube coiled upon itself in constantly varying directions, the periphery being determined by the last circlet of the coil. The tube which represents the cavity occupied during life by the main body of the animal is never, so far as I have been able to discover, subdivided into chambers. The shell-wall throughout is traversed by a multitude of very minute tubuli. The author considers that this form shows many nummulitic affinities, although less complex in general structure. He proposes the name Archædiscus for the genus, and for a specific name *Karreri*, after Dr. Felix Karrer, of Vienna. A more minute description, with figures, will be found in the *Annals of Natural History* for October.—*K.*

How to Mount Foraminifera from Chalk.—In answer to "B. M.'s" query of how to obtain and mount foraminifera from chalk, I will endeavour to explain one process always employed by a friend of mine, as well as myself; and we can testify to its merits. First, scrape a small portion from the original mass, and shake it up well in pure water; leave this a few minutes, pour away the water and add a fresh quantity; shake up as before, and repeat two or three times. To examinine this washing, take a little of the residue, and spread it on a slide, and when quite dry add a few drops of turpentine. This, when viewed by a power of 250 diameters,

will generally show the organisms very well. They are then generally mounted in Canada balsam. The accumulation of the powder caused by the action of the rain, or exposure to atmospheric action, at the foot or any projection of the chalk cliffs will afford better specimens than that which is "scraped," as the organisms are less broken than in the former. If the foraminifera are of a larger size, though transparent enough to be mounted in balsam, the air *must be expelled*, otherwise the objects will be altogether unsatisfactory. To accomplish this they must be immersed in turpentine and kept exhausted under the air-pump until the turpentine has taken the place of the air, when they can be mounted. If to be viewed by transmitted light, Canada balsam is certainly the best medium; if for reflected light, no plan is so simple, easy, and effectual, as attaching them with a little gum to wooden slides. They should be differently arranged, so as to get a good variety. I would advise "B. M." to lay out 2s. 6d. on Mr. Thos. Davies's admirable work on the preparation and mounting microscopic objects: it is a most useful book, and I am convinced no amateur mounter should be without it.—*Thos. Palmer, B. Sc.*

NOTES AND QUERIES.

THE POSTAL MICRO-CABINET CLUB.—Many of the readers of SCIENCE-GOSSIP will remember that in the May number there appeared a suggestion respecting the formation of a circulating cabinet for microscopic objects. As the address of Mr. Atkinson, the writer of the notice, was not inserted, I was unable to write to him privately, and too busy to reply through your pages at that time; but I did so in August, and at the same time stated that if Mr. Atkinson would favour me with his address I felt sure I could find him six gentlemen who would be willing to join in so pleasing an undertaking. I then set to work to look up my half-dozen friends, and when towards *the end* of August I received a letter from Mr. A., instead of six I had found thirty members, and had also roughly framed a set of rules. We have now a club formed of thirty-six members, who are divided into three circuits, which we call Northern, Central, and Southern; Mr. Atkinson, the first proposer, being our president. Our method of proceeding in the first instance is this: an empty box is sent to first member on each circuit, who places in it a slide and sends it on to the next, who does the same, &c. &c. The twelfth member, who puts last slide into the box, instead of returning it to first member, will send it to Hon. Sec., who will send it round next circuit, then the next; and when it has been the entire circuit of the club it will again be sent to first member, who will take out his own slide and replace it by another. When it is conjectured that each box has gone half round its own circuit another box will be started again, so when the club is in thorough working order each member will be supposed to receive a box about once a week. Suggestions, hints, and criticisms are requested from all the members: from these I hope, as opportunity offers, to cull little scraps of information that may from time to time enrich the pages of SCIENCE GOSSIP.—*Alfred Allen, Hon. Sec.*

THE POSTAL MICRO-CABINET CLUB RULES.

1. That this club be called the "Postal Micro-Cabinet Club."

2. That the club be divided into circuits, and that not more than twelve members shall form a "circuit."

3. That the purpose of the club shall be the circulation of microscopic objects, and the general advancement of microscopy amongst its members.

4. That each member, on receiving the box of slides, shall keep it *three* evenings only; he shall then take out his own slide and replace it by another, and shall not fail to post it to next name on the list by *first* post after third evening, having first inserted the dates on which he received and despatched the box, in the form provided for that purpose, which must also be signed with his initials in the margin.

5. That no slide may on any account be removed from the box by any person but the owner, and then only after it has compassed the full circuit, except it be in the case provided against in Rule 17, unless it be by special permission or request of the president.

6. That Sunday evening shall not be counted; a box, therefore, received on Saturday need not be posted till first post on Wednesday.

7. That every twelfth member (being last man on each circuit) shall, after the third day, send the box to the hon. sec., together with all manuscripts thereto belonging.

8. The hon. sec., on receiving a box back from its own circuit, shall send it on to the next circuit, and so on, until it has been seen by all the members; but no member shall take from, or add to, any box which does not belong to his own proper circuit; he is, however, requested to criticise such slides, and to add what he pleases to the manuscript department accompanying the box.

9. That each member be requested freely to criticise every slide that comes before his notice; to reply to best of his ability to every question he may find on the list unanswered, or correct (if necessary) any answers already given; to make any suggestions that may occur to him, and to ask for any information he may wish to obtain.

10. That every member at the formation of the club shall pay the entrance-fee of 1s.; and on the 29th September, 1874, and each succeeding year, the sum of as an annual subscription.

11. That the entrance-money and annual subscriptions shall be paid to the hon. sec. for the time being, which amounts shall form a fund whereout to provide the necessary boxes for micro-objects, and other expenses to which he may be put; and it shall be the duty of the hon. sec., at the end of each year, to render to the president an account of his receipts and disbursements on behalf of the club.

12. Every candidate for membership shall send his name to the hon. sec., who will place it on the paper ruled for that purpose, and send it round each circuit with next box, when every member knowing such candidate will vote for or against his election, at their discretion; should such candidate, however, be unknown to every member, he will be requested to give the names of two gentlemen as referees.

13. That Mr. Alfred Atkinson, of Brigg, be appointed president, and Mr. Alfred Allen, of Felstead, honorary secretary, for the first year of

the club; at the expiration of which time, should they be willing again to serve, they may be re-elected by a majority of the members; or any other members may be elected in their stead.

14. That any member who shall, by accident or otherwise, break or damage, or cause to be broken by bad packing, any object whilst it is under his care, or before it is received by next member, shall make good the same; the liability, however, of such member shall not exceed the sum of 2s. for each slide broken or damaged, which amount (if it cannot otherwise be agreed upon) shall be assessed by the president and paid through the hon. sec.; but should an object, although properly packed, be broken in transit, it shall be made good—if not exceeding the value of 2s.—from the funds of the club.

15. Slides above the value of 2s., and not exceeding 5s., may be insured to the owner by remitting to the hon. sec., at the time of sending the slide, *one penny* in postage stamps for EVERY shilling in the value of the slide; and every slide broken, where practicable, shall be replaced in kind.

16. To insure safety in transit, not more than twelve objects shall be packed in one box, which shall be wrapped in the accompanying *block wrapper*, and securely tied with strong string; a luggage-label bearing the address, with sufficient stamps to prepay postage, shall be securely tied to *one end*, and to no other part of the box.

17. Any member receiving the box with its contents at all damaged, must at once inform the hon. sec. of the fact, and send on to him at the same time the broken or damaged slide or slides.

18. No member shall send any but good slides, and each slide must bear his name and address.

19. Should the slides sent round be for exchange, such may be stated in the notices accompanying the box.

(Signed) ALFRED ATKINSON, *President*.
ALFRED ALLEN, *Hon. Sec.*

DEATH OF A DYTISCUS (p. 190).—I cannot think it an unavoidable conclusion that the beetle found by "H. G. F." was killed by the mollusk which had attached itself to the antenna of the insect. The aquatic species of snails are well-known to act as scavengers, destroying decaying vegetation and dead animals, and the Dytiscus, evidently very languid when found, may have been *in articulo mortis* at the time its apparent enemy fastened upon it. These beetles, it may be noted, do occasionally quit the pond or stream, and they will even take a flight to some distance.—*J. R. S. C.*

SCARCITY OF BUTTERFLIES IN JUNE.—It is observable that in most seasons there is a period of two or three weeks in the summer during which hardly any butterflies are visible in the fields, lanes, and woods, and this lull of butterfly life generally falls in the month of June, when it appears strange to us to have the landscape, now in its leafy glory, denuded of those lively tenants of the air. The truth is, however, that the break is to be accounted for by the disappearance of the spring flights of butterflies, and the non-emergence of the summer broods. In this season (1873), the absence of butterflies throughout June was notable in many places near London. Some of the meadow species were greatly retarded by the ungenial spring, as well as diminished in numbers. *H. janira*, usually looked for early in June, was coming out slowly five or six weeks later in Kent; and about the middle of July what should have been the May brood of the large Skipper (*H. sylvanus*); for it could hardly have been the autumn flight in advance.

LONDON BOTANY.—Wm. Somerton, who in the October number of SCIENCE-GOSSIP asked for a good book treating of botany, suitable for a Londoner, will find "The Botanist's Pocket-book," by W. R. Hayward, an excellent guide, and a most suitable work for *practical* botany. I could also recommend Oliver's "Lessons in Elementary Botany." Hayward's "Pocket-book" is published by Bell & Daldy, York-street, Covent-garden. I think the price is 4s. 6d. Oliver's is, I believe, published by Macmillan, price also 4s. 6d. Lindley's "School Botany" is also a good work, published, I believe, by Bradbury & Co., at about 5s. I might also mention Cooke's "Manual of Botanic Terms," published by Robert Hardwicke, Piccadilly, price 2s. 6d.; also Cooke's "Manual of Structural Botany," Hardwicke, 1s. Moore's "British Ferns," at 2s. 6d. and 1s., published by Routledge, is also a first-class work on the subject of ferns.—*W. S. Palmer.*

THE VANESSIDÆ (page 263).—I can fully corroborate the statement of your correspondent "E.D.M." as to the scarcity of Atalanta during the past season. It used to be one of the commonest of the Vanessas in this neighbourhood, but I have for the last two seasons hardly seen a specimen. With respect, however, to finding the larva, I have always met with it most abundantly during the last three weeks of August. It is a very easy larva to find, the dodge being to look, not for the caterpillar or its traces, but for the spun leaves which it inhabits; and the underside of a nettle-leaf being white, the domicile is therefore a conspicuous object.—*C. Lovekin.*

REARING LARVÆ (p. 238).—In rearing lepidoptera from the egg, I keep the larvæ for a time under an inverted wine-glass on a piece of paper, and when of a fair size remove them to the ordinary boxes. Directly the eggs hatch, I put them at once under the glass with the most delicate and tender leaves of their food-plant I can find. I have had little or no trouble in this respect, and have been generally successful.—*W. H. Warner, Kingston.*

BRITISH SHREWS.—I beg to thank "T. W." for his obliging answer to my query; but with all due respect I must say I am not a whit wiser than I was before. The three species mentioned by "T. W." as occurring in Professor Bell's book, do not include the whole of the British shrews, since I myself have information of four kinds; viz., the Common Shrew (*Corsira vulgaris—Sorex araneus* of Bell), the Rustic Shrew (*Corsira rustica*), not mentioned by Bell, the Water Shrew (*Crossopus fodiens—Sorex fodiens* of Bell), and the Black Water Shrew, or Oared Shrew (*Crossopus ciliatus—Sorex remifer* of Bell). The *Corsira rustica* is, I believe, much larger than the other shrews, and, like the two species last mentioned, is of aquatic habits. So much for those already recognized by naturalists. The object of my query was to get information of the so-called varieties or species which are occasionally heard of through the natural history periodicals.—*W. H. Warner, Kingston.*

FRESH-WATER AQUARIUM.—Will any of your readers kindly give me a few hints as to the formation of a fresh-water aquarium? I wish to know what kind of tank would be suitable, and also what fish, mollusks, insects, &c., it should contain.—*M. A. H.*

Destroying Moles.—"R. B. H." may destroy moles effectually by procuring a quantity of large earth-worms and cutting each in two; then sprinkle them well with powdered nux vomica, find the run or burrow of the animal by piercing the ground with an iron-pointed rod or with a pointed stick: near the hedge is the best place, as that is generally their home. Cut out a piece of the ground rather wider at the surface than at the bottom, by making four cuts, one at each end, and on each side remove the earth carefully with a small sharp spade; then put in the run a quantity of the doctored worms with a stick, and replace the earth, the neater the better, as moles will alter their runs rather than work in the light. In a few days spread the molehill to see if they still throw them up; if not, they are all done for; but if any fresh hills are seen, repeat the dose. Early in April is the best time for doing it, as fresh soil is thrown to the surface, and moles often do much good by their inartistic work.—*R. V.*

Palates of Spiders.—Will F. Burnard, who wrote a short article on "palates of spiders" in the May number of this magazine, mind inserting a notice in next month's Science-Gossip, stating his method of preparing insect specimens with carbolic acid and chloroform? I have tried it, and found it a very expeditious way of mounting, but I totally failed in making good slides, because I could not by any means get rid of the "interior arrangements," which on being pressed squeezed out.—*H. M. J. Underhill.*

Sending Objects by Post.—In last number of Science-Gossip I find a communication from "A. S." stating that the plan I recommended for sending microscopic slides by post has been known for years, &c. "A. S." may may not have meant it, but his communication reads exactly like—If he supposes he has found out anything *new*, let me tell him it is "as old as the hills," as the saying is. Now if your readers will turn to the number of Science-Gossip for last September, page 214, they will find that so far from claiming any merit (if there be any) for the idea, I distinctly stated that "I do not claim the merit of the invention. It is by no means new, but nevertheless does not appear to be known to many;" and I was led to this conclusion by the very frequent complaints of objects, &c., being received by you in so smashed a state as to be utterly useless. I have only to add that the plan of a detached label bearing the stamps and address is needed only when the containing box is slight,—as "chip," or "cardpaper," &c. But as we can now (thanks to "Sir Roland-le-Grand") send our slides in boxes made of half-inch plank, if we please, of course the detached label precaution is needless. —*H. U. J.*

Wood Ants.—Whilst opening a nest of wood ants (*Formica rufa*) I observed that they possessed the power of ejecting a liquid from the extremity of the abdomen to a distance of eight or ten inches. The drop was about the size of a small pin's head, and one individual was able to perform the feat three or four times in succession. When in the act of discharging the liquid (formic acid), the abdomen was bent under the thorax, an attitude which they always assume when alarmed. I should be obliged if you could tell me whether this fact is generally known, and also give me any more information on the subject, as I have never observed it hitherto. The time of observation was at the beginning of this month (October).—*N. M. Richardson.*

Horse-eye Nut.—Can any of your correspondents inform me what is the proper name for the nut called commonly Horse-eye nut,—whether it is the same as the Calabar bean (*Physostigmatis faba*)? I think it is, the form being the only difference. —*W. K.*

Trachinus.—The fish mentioned by the *Echo* correspondents may be either *Trachinus Draco*, the Sting-gull or Catfish, or the *Trachinus Vipera*, Little Weaver, Otterpike (see Couch, vol. ii. p. 483 et seq.). The latter is common at the mouth of the Tyne. The shrimpers generally carry a small bottle of sweet oil to apply in case they are stung. I have seen persons after being stung: there was great swelling, and discoloration almost to blackness. The swelling generally goes down in twenty-four to thirty-six hours, discoloration perhaps lasts longer; I have, however, never heard of a case being so bad as nearly requiring amputation.—*R. Y. Green.*

Cement for Aquaria.—A rectangular tank of about ten gallons capacity, and constructed of plate-glass with a zinc bottom and massive wooden pillars, troubled me much for a long time by leaking. It was cemented with red and white lead, covered with a coating of shellac varnish, and was constantly being recemented in the faulty places; but after the lapse of three weeks or so, it would leak afresh; and this went on till, in despair, I was forced to give up repairing it as a bad job. Some time after, a friend recommended a cement composed of resin, tar, and linseed-oil, which he assured me was the best for the purpose of making water-tight this troublesome aquarium. I therefore tried it without delay, and I am pleased to relate that the said aquarium has now been standing just a year with the water unchanged, and shows no signs of leakage whatever. I cannot give the exact proportion of each ingredient of which this cement was composed, but I used about an eggcupful of oil and 4 oz. of tar to 1 lb. of resin, and allowed them to melt together in a pipkin over a gentle fire. If much oil be used, the cement will in all probability run down the angles of the aquarium: to obviate this it should be tested before use by allowing a small quantity to cool under cold water, and if not found sufficiently firm, allowed to simmer longer, or have more tar and resin added, which will answer the same purpose. The cement should be poured in the angles of the aquarium while in a liquid state, but not when boiling, or it would most assuredly crack the glass. The cement will become firm in a few minutes, and the aquarium may then be tilted up in a different position while a second angle is treated likewise; and so on till the whole work is completed. I think "W. K. G." would find this more suited to his purpose than "coaguline," which is so precious for many purposes, out which for this work seems hardly coarse enough. This combination of tar and resin adheres firmly to the glass, is so pliant that it may be pressed into any shape with the finger, and it does not communicate any poisonous quality to the water.—*Henry A. Auld.*

Snakes and Toads.—I see that in the July number of Science-Gossip, W. H. Warner inquires whether "the snake swallows toads." I believe such to be the case, though it is not such a favourite repast as the frog, since it is able to exude an acrid matter from its skin, which is covered with glandular warts. It is preyed upon by owls, buzzards, &c., besides snakes.—*A. P. H.*

NOTICES TO CORRESPONDENTS.

"SWEET-MOLY."—The plant sent is the common Golden Rod (*Solidago virga-aurea*).

L. S.—It is a common thing for a fungus of the same kind as that sent (*Hydnum repandum*), to grow in circular layers, so as to inclose objects.

JAMES A.—No. 1. Common Goose-foot (*Achillea ptarmica*); 2. Squalid Rag-wort (*Senecio squalida*, an uncommon plant); 3. Common Bog-bean (*Menyanthes trifoliata*).

R. C.—The question as to whether *Eozoon canadense* is really a fossil is not yet settled, but the balance of evidence is certainly in favour of its being such.

H. COCKSON.—The specimens inclosed were what are commonly called "Oak-spangles," from their occurrence on the backs of oak-leaves. They are produced by an insect, a species of *Cynips*.

C. COCKSON.—You will find an account of vegetable remains of the Middle Eocene vegetation in the Reports of the British Association for 1869, 1870, and 1871.

J. L. H.—The circumstance referred to is not unusual, especially in southern districts. The lateness of the migration of the Swallow tribe is frequently affected by local causes.

W. B. DAVIES.—Moore's "British Ferns," and Newman's work on the same subject, contain the most exhaustive treatment of ferns. They are both, we believe, published by Van Voorst.

E. H. W.—It is impossible that cheese-mites should be developed spontaneously. They are hatched from germs or eggs in every case.

E. L.—Thanks for the specimens. We cannot commit ourselves to any definite time as to when "Exchanges" shall appear. We devote the whole of one page every month to "Exchanges" and "Answers," and, in the interest of our subscribers, cannot spare more. It follows, therefore, that, if we have an excess of "Answers" or "Exchanges," some of the latter *must* stand over till the following month. We endeavour to do our best for all, querists and exchangers, as well as ordinary subscribers, and we rely on their gentlemanly courtesy to bear with us if the inexorable limits of space oblige us occasionally to disappoint them.

G. H. K.—The "China tinder" is the well-dried interior of the common Puff-ball (*Lycoperdon*).

TO CORRESPONDENTS.—We have been obliged, at the last moment, to defer several "Answers" and "Exchanges" until the January No.

EXCHANGES.

MOUNTAIN Limestone Fossils for Foraminifera, or any other good mounted object for the microscope.—J. Harker, Richmond, Yorks.

Sphæria fimbriata for other Micro-fungi or foreign Ferns.—Miss Jelly, 4, Gensing-terrace, St. Leonard's-on-Sea.

PORTIONS of rib-bones of Ichthyosaurus, and Vertebra and Rib-bones of Plesiosaurus, for section-cutting, for microscopic Slides.—E. Lovett, Holly Mount, Croydon.

A SLIDE of *Orthosira Dickieii* (from original cave near Aberdeen) illustrating sporangial frustule, &c., as described by Mr. Kitton in a recent number of SCIENCE-GOSSIP, for good Marine Diatomaceous gatherings, either home or foreign.—Rev. G. Davidson, Logie-Coldstone, Aberdeen.

LOND. CAT. BRIT. PLANTS, Nos. 136b, 141 oxyptera, 174 (3 sub. sp.), 185b, 345c, 672, 897a, 1123 obtusifolius, 1215, 1234c, 1322c, 1340, 1362 acutum, 1428c, &c., offered for 17, 56, 62, 75, 91, 144, 156b, 176, 177, 181*, 183, 256, 289, 292, 302, 310*, 371*, 376, &c., or for foreign plants.—J. Harbord Lewis, 180, Mill-street, Liverpool, S.

SEVERAL Duplicate Microscopic Slides for others; Entomological preferred.—J. S. Harrison, 48, Lowgate, Hull.

HOSHIER'S "Niger Flora," published at 25s. Desiderata, British Plants; names sent on application.—Whatton Manor, Notts.

SECTION 1 in. long of Fruit of Palm, well-mounted, for slides or material.—Send list to H. B. Thomas, Boston, Lincolnshire.

LAND and Fresh-water Shells for Birds' Eggs or well-set Lepidoptera.—Seth Smith, Crescent-street, Cross-bank, Batley, Yorkshire.

MICROSCOPIC Accessories wanted for Polariscopic and Diatomaceous Slides perfectly mounted.—For list apply to H. Cockson, 24, Rodney-street, Liverpool.

Clausilia Rolphii for *Clausilia biplicata* and *Bulimus montanus*.—J. FitzGerald, West-terrace, Folkestone.

OCEAN SOUNDINGS (not common); wanted good objects.—I. H. M., 86, Week-street, Maidstone.

GASTRIC Teeth of Cockroach (*Blatta orientalis*), or Scales of Death's-head Moth (*Acherontia atropos*), either, well-mounted, for any other well-finished slide.—C., 5, Culloden-street, Bromley, London, E.

DUPLICATES, Pinieolana, T. W. Album, Velleda, Cerasa, Batis, Nictitans, Glareosa, Rufina, Litura, Citrago, Fulvago, Testata, Plagiata, for other Lepidoptera.—Jno. Harrison, 7, Victoria-bridge, Barnsley.

WELL-MOUNTED Microscopic Slide for Microscopic accessories and mounting materials.—H. Cockson, 24, Rodney-street, Liverpool.

WELL-MOUNTED Slides of Rare Diatoms and Polycistina, Springfield, Barbadoes, for Diatom Earths, Guanos, &c.—H. B. Thomas, Boston, Lincolnshire.

DUPLICATES.—A few Templi funales alive for breeding with. Accepted offers only replied to.—Jno. Harrison, 7, Victoria-street, Barnsley.

SECTION of Leaf of India-rubber tree (unmounted) offered for good diatoms unprepared.—W. White, Litcham, Norfolk.

CARPENTER'S "Microscope and its Revelations," wanted for Slides.—Thomas Lisle, Moorfields, Wolverhampton.

MOUNTED DIATOMS from this locality for their equivalents in mounted diatoms, or diatom deposits.—Send specimen and address to G. W. Morehouse, Wayland, New York, U. S. A.

PURE DIATOMS, cleaned, and some uncleaned, from different localities, for good Slides or Material.—Geo. Elisha, 2, Cross-street, Shepherdess-walk, City road, N.

WILL any Microscopist who goes in for Infusoria occasionally interchange with me, per post, bottles of water? I have suitable boxes and bottles.—Rev. A. B., Private Bag 219, Post-office, Birmingham.

SPORES of Stag's-horn Fern (opaque), Section of Rhinoceros Horn, ditto of Red Deer, ditto of Whalebone, well mounted, for Diatoms or other good Slides.—F. M. Swallow, Blackrod, near Chorley, Lancashire.

POPULAR SCIENCE REVIEW, 4 vols., 1868, 1869, 1870, and 1871, strongly bound in half-calf, for the Zoologist, 1866, 1870, 1871, 1872.—Richard M. Barrington, Fassaroe, Bray, co. Wicklow.

Cochlicopa tridens, var. *crystallina*, for *Vertigo antivertigo* or *V. alpestris*.—G. S. Tye, 58, Villa-road, Handsworth, Staffordshire.

TRANSVERSE SECTIONS (mounted) of Foot-pad of Elephant, Guanaco Hoof, and diseased Horn of Rhinoceros; long Sections of Horns of Koodoo and Rhinoceros, and Palate of *Patella pellucida*.—Apply to J. Lazenby, 2, Sarum Villas, Basingstoke.

Helix obvoluta (English) for either of the following:—*Clausilia biplicata*, *Cl. parvula*, *Testacella haliotidea*, *Bulimus Goodalli*, *Limnæa glutinosa*, *H. pomatia*.—C. Griffith, St. Swithin-street, Winchester.

SLIDES of Ovipositor of *Cynips quercus Lignicola*, *Stenocephalus agilis*, and *Aphrophora spumaria*, for a corresponding number of Slides; Entomological preferred.—J. O. Harper, Dereham-road, Norwich.

SPECIMENS of *H. virgata*, *H. caperata*, *H. cantiana*, *H. hispida*, *H. arbustorum*, *H. rupestris*, and *C. elegans*, for other Shells or British Birds' Eggs.—W. K. Mann.

BOOKS RECEIVED.

"The Graft Theory of Disease, an application of Mr. Darwin's Theory of Pangenesis to the explanation of Zymotic Diseases." By J. Ross, M.D. London: J. & A. Churchill.

"Boston Journal of Chemistry." October.

"The American Artisan."

"The Lens." August, 1873.

"Grevillea." November, 1873.

"Les Mondes."

"Land and Water."

"The Geology of the Redesdale Ironstone District." By G. A. Lebour.

"Journal of Applied Science."

COMMUNICATIONS RECEIVED FROM—F. B. L. G.—A. P. H.—J. P.—F. L.—F.—A. T.—J. J. W.—W. L.—G. W. M.—F. M. S.—W. W. S.—T. B.—M. D. B.—J. H.—C. B. G.—A. L.—J. B. D.—E. L.—H. G.—C. B. B.—W. H. B.—J. O. H.—W. A.—E. L.—T. L.—M. J. G.—R. Y.—W. W. S.—A. A.—W. E. S.—W. S. P.—G. S. T.—T. A.—R. Y. G.—J. C.—B. J. B.—C. J.—H. U. J.—J. F. G.—C. G.—R. M. B.—W. K.—T. H. S.—T. M. R.—A. A.—W. B. D.—E. H. W.—G. E.—F. C. S. R.—J. F.—H. A. M.—W. H. W.—H. M. J. U.—A. C.—H. G. G.—W. T. O.—W. C.—E. E.—G. W. Y. S.—C. J.—W. W.—J. C.—J. H.—T. B. B.—R. A. P.—H. C.—C. C.—J. H. M.—J. P. S.—S. W.—J. L. H.—H. B. T.—E. B. Y. W.—C. G.—T. P.—A. S.—W. K. M.—J. W.—M. H. C., &c.

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